

An overview of Glaucoma and Cataract in Pseudoexfoliation

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Abstract

Background: Pseudoexfoliation (PXF) is said to be the most common identifiable form of secondary open angle glaucoma. This type of glaucoma has a more prolonged clinical course and worse prognosis. PXF is a strong predictor of glaucoma progression independent of raised Intra Ocular Pressure (IOP) and other risk factors. **Aim:** To study the occurrence of glaucoma, type of cataracts associated with pseudoexfoliation. **Materials and Methods:** Study included 137 patients (220 eyes) who were screened for PXF, presence of pseudoexfoliative material and status of lens was observed under slit lamp examination, Applanation tonometry, gonioscopy, visual fields, dilated fundus examination was performed and observations recorded. **Results:** Most common site of deposition of Pseudo exfoliative material was pupillary margins, seen in 96.36% of cases. Gonioscopy revealed open angles in 92.72% of eyes. IOP was raised in 33.18% of cases optic disc changes and visual field abnormalities were detected in 35% of eyes. Glaucoma was found in 35% of patients of pseudoexfoliation and nuclear cataract was associated in 60% of patients with pseudoexfoliation. **Conclusion:** Pseudoexfoliation is associated with open angles and 1/3rd of patients with pseudoexfoliation developed secondary open angle glaucoma during their clinical course. Nuclear cataract was most common type of cataract associated with pseudoexfoliation. Therefore all patients with pseudoexfoliation should be evaluated for glaucoma. **Key Words:** Pseudoexfoliation, Glaucoma, Nuclear cataract, Intra Ocular Pressure, visual field, Optic disc.

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INTRODUCTION

Pseudoexfoliation is a generalised disorder of the extracellular matrix characterised by the production of abnormal basement membrane like material. Pseudo exfoliative material is composed of amyloid, laminin, collagen, elastic fibers, and basement membrane, seen in ocular tissue and other extraocular tissues of, lungs, liver, kidneys, heart, vessel walls, cerebral meninges, and skin.

¹Pseudoexfoliation glaucoma is result of the accumulation

of pseudoexfoliative material on to the trabecular meshwork causing outlet obstruction and leading to an increase in Intra ocular pressure (IOP). ²Clinically, the pseudoexfoliation material can be seen deposited on the papillary ruff, anterior lens capsule and other anterior segment structures. It has a characteristic distribution on the anterior lens capsule of a central disc surrounded by a clear zone which is surrounded by a peripheral ring-like deposit of granular material. Pseudoexfoliation is said to be the most common identifiable form of secondary open angle glaucoma.^{3,4} Pseudoexfoliation of lens is known to be associated with weakness of zonules, higher incidence of subluxation and phacodonesis, poor mydriasis. Corneal endothelial dysfunction, higher rates of vitreous loss, capsular phimosis and opacification have been reported after cataract surgery. The prevalence of pseudoexfoliation worldwide ranges from 0.5% in those <60 years to 15% in those > 60 years⁵ and prevalence of glaucoma among subjects with PXF based on two population based surveys in south India was 7.5% and 13% respectively.^{6,7} Thus, considering the clinical

importance of pseudoexfoliation, a study has been carried out in this institution taking into account various aspects of this condition.

METHODOLOGY

This was a prospective hospital based quantitative study done at a tertiary care rural Hospital. Patients screened and found to have Pseudo exfoliation unilaterally or bilaterally were included in the study. 137 Patients with pseudoexfoliation were included into the study and evaluated. After obtaining informed consent history and demographic data was collected and detailed ocular examination including Best corrected visual acuity, Slit lamp examination for presence of pseudo exfoliative material, Applanation tonometry, Gonioscopy, Visual fields analysis, Dilated fundus examination and examination of lens was performed. Presence of pseudoexfoliative material on lens was looked for after pupillary dilatation. Findings were recorded and analysis of the data done. Intra ocular pressure measurement was recorded by Goldmann Applanation Tonometry. Gonioscopy was performed with Goldmann four mirror contact gonioscope, Visual field analysis was done by

using Humphrey Auto Field Analyser. Stereoscopic evaluation of fundus was done with indirect ophthalmoscope using 20D lens and slit lamp fundoscopic examination using 90D lens and Optic Disc was assessed for cup disc ratio, characteristic glaucomatous excavation of the neuroretinal rim and typical wedge shaped nerve fiber layer defects. Pseudoexfoliation was diagnosed clinically by the presence of typical pseudoexfoliation material at the pupillary border on undilated slit lamp examination (or) anterior lens capsule on dilated examination (or) the trabecular meshwork on gonioscopy. Diagnosis of pseudoexfoliation glaucoma was made based on the presence of:

- If IOP is > 21 mm Hg in either eye
- Vertical cup disc ratio is >0.7:1 (or) Cup disc asymmetry >0.2 between the two eyes (or) Focal thinning, notching of neuroretinal rim
- Presence of glaucomatous visual field defects.

Statistical Analysis was done by Statistical Package for Social Sciences (SPSS), Version 19.

RESULTS

Total number of patients included in the study was 137. Total number of eyes included in the study was 220. Following were the observations made in our study. Out of total 2750 cases screened 137 Patients (220 Eyes) had pseudoexfoliation.

TABLE 1: Age distribution in pseudoexfoliation: (N=137)

Age (Years)	No. of Patients (n)	Percentage (%)
< 30	1	0.7
31 -40	3	2.1
41 -50	20	14.5
51-60	26	18.97
61-70	38	27.7
>70	49	35.7
Total	137	100

Table 2: Gender distribution In pseudoexfoliation : (N=50)

Sex	No. of Patients (n)	Percentage (%)
Male	79	57.6
Female	58	42.4
Total	137	100

Out of 137 patients, 79 (57.6%) were Males and 58(42.4%) were Females. Male : Female ratio was 1.36:1.

Table 3: Laterality Distribution In Pseudoexfoliation: (N= 137)

Laterality	No. of Patients (No. of Eyes)	Percentage (%)
Unilateral	54 (54 Eyes)	39.4
Bilateral	83 (166 Eyes)	60.6
Total	137 (220 Eyes)	100

Out of 137 patients 54 (39.4%) were having unilateral pseudoexfoliation, 83 patients (60.6%) were having bilateral pseudoexfoliation.

Table 4: Distribution of Pseudoexfoliative Material

Distribution of Pseudo Exfoliative Material	No. of Eyes (n)	Percentage (%)
Pupillary Margins	212	96.36
Anterior Lens Capsule	189	85.90
Angle of Anterior Chamber	151	68.63

TABLE 5: Gonioscopic Grading Angle of Anterior Chamber (N=220 Eyes)

Angle of Anterior Chamber	No. of Eyes (n)	Percentage (%)
Grade III-IV	204	92.72
Grade II-III	14	6.36
Grade < II	2	0.90
Total	220	100

Out of 220 eyes, 204 eyes (92.72%) had open angle of Grade III – IV.

TABLE 6: Glaucomatous Changes In Pseudoexfoliation (N=220 Eyes)

IOP	Optic Disc Changes	Visual field changes
< 21mm Hg 147 (66.82%)	(<0.7:1 CDR) 143 (65%)	Normal 143 (65%)
>21mm Hg 73 (33.18%)	(>0.7:1 CDR) 77 (35%)	Abnormal 77 (35%)
Total n =220		

Out of 220 eyes, 154 eyes (66.82%) had intraocular pressure <21 mm Hg, 66 eyes (33.18 %) had intraocular pressure > 21mm Hg. 143 (65.00%) eyes had normal visual fields and optic disc cupping of <0.7:1CDR, 77 eyes (35.00%) had abnormal visual fields and glaucomatous cupping of >0.7:1CDR.

TABLE 7: Glaucoma In Pseudoexfoliation: (N=220 Eyes)

Pseudoexfoliation	No. Of Eyes (n)	Percentage (%)
Without Glaucoma	143	65.00
With Glaucoma	77	35.00
Total	220	100

TABLE 8: Type of Cataract in Pseudoexfoliation (N=220 Eyes):

Type of cataract	No. of eyes(n)	Percentage (%)
Nuclear cataract	132	60.00
Immature cataract	73	33.18
Mature cataract	14	6.37
Hyper mature cataract	1	0.45
Total	220	100

Out of 220 eyes, 132 (60.00%) had nuclear cataract, 73 (33.18%) had senile immature cataract, 14 (6.37%) had senile mature cataract and one patient had hyper mature cataract.

DISCUSSION

This was a prospective study conducted on 137 patients (220 eyes) with pseudoexfoliation.

Age incidence of pseudoexfoliation on lens: Pseudoexfoliation of lens rarely occurs below 50 years of age. The study literature shows the highest incidence of the condition to occur between 60 -80 years.⁸ Arvind H *et al*⁹, Shazly *et al*,⁸ S learner *et al*⁹ reported that the mean age of subjects with pseudoexfoliation was 64.7, 68.15 and 72.94 years respectively. Wani Fouzia R *et al*¹⁰, Yeshigeta G. *et al*,¹¹ found that 64.7% and 67.8% of

patients belong to age group > 60 years respectively. In the present study, the mean age of pseudoexfoliation was 68.04 years. 65.4 % of patients were in the age group of age group of 51-60 and above, which is comparable with previous studies. This indicates that pseudoexfoliation is a disease of old age with highest incidence after 60 years of age. **Gender distribution:** Though pseudoexfoliation is generally found to occur some years earlier in males than females there is no appreciable sex preference. Yeshigeta G. *et al*¹¹, found 68.75% male incidence against 31.25% female incidence, with M:F – 2.2:1

Rashad Qamar Rao *et al*¹², Shazly *et al*⁸, Arvind H Paul⁷ found no statistically significant difference in sex distribution among pseudoexfoliation patients. In present study, Out of 137 patients, 79 (57.6%) were Males and 58(42.3%) were Females. Male : Female ratio was 1.36:1 which showed no statistically significant sex predilection. Male predominance in studies by Yeshigeta *et al*¹¹, can be attributed to racial difference. **Laterality:** Most researchers have found that bilateral incidence of pseudoexfoliation. Kozobolis *et al*¹³, reported 27.2% of unilateral PXF and 72.8% of bilateral PXF, Yeshigeta *et al*¹¹, Tliksew *et al*¹⁴, Shazly *et al*⁸ found unilateral pseudoexfoliation in 33.3%, 37.8%, 17.8% and bilateral pseudoexfoliation in 66.7%, 62.2%, 82.2% cases respectively. In present study Out of 137 patients 54 (39.4%) were having unilateral pseudoexfoliation, 83 patients (60.6%) were having bilateral pseudoexfoliation, which is comparable with previous studies. This suggested that unilateral PXF is in fact a bilateral but asymmetric condition. Percentage of unilateral disease decreased with a corresponding increase in bilateral disease with increasing age.

Distribution of pseudoexfoliative material: Pseudoexfoliation material appears as deposits of granular material likened to coarse white powder occurring on the anterior lens capsule, pupil margin, zonules, ciliary body, iris crypts, in the anterior chamber angle and floating freely in aqueous.¹⁵ Qamar Rao *et al*¹², Yeshigeta *et al*,¹¹ and Wani Fouzia *et al*,¹⁰ noted Flakes at pupillary margin in 81.7%, 95.2% and 76.5% cases respectively. Alan P Rotchford *et al*¹⁶ showed that exfoliative material was present at pupillary border in majority of patients. Present study showed presence of pseudoexfoliative material in 96.36% indicating that it is a common site where exfoliative material gets deposited, could be due to rubbing of exfoliated material from anterior surface of lens capsule due to pupillary movement. The pseudoexfoliation material on anterior lens capsule is initially continuous and movement of iris rubs off the material immediately under its border, resulting in formation of lacunae between the central and peripheral zones. Exfoliative material was seen on anterior lens capsule in 22.6% by Wani Fouzia R¹⁰ but Rashad Qamar Rao, *et al*¹² reported presence of pseudoexfoliative material on lens capsule in 98.3% of cases. Present study shows the presence of pseudoexfoliative material on anterior lens capsule (peripheral band) in 85.90%. Pseudoexfoliative material was found in angle of anterior chamber in 56.7% cases by Rashad Qamar Rao *et al*¹². Present study shows flakes of pseudoexfoliative material in the angle of anterior chamber in 68.63%, which is comparable with the previous studies. **Intraocular pressure:** There is

significant association between high intraocular pressure and pseudoexfoliation . Wani Fouzia *et al*¹⁰ , Rashad Qamar Rao *et al*¹² , Yeshigeta *et al*¹¹, reported raised intraocular pressure in 25%, 40%, 28.5% of patients respectively. In present study 33.18 % had an intraocular pressure more than 21 mm Hg, which is comparable with the previous studies.

Glaucoma in pseudoexfoliation: A significantly higher prevalence of ocular hypertension and glaucoma is observed in PXF eyes when compared with normal eyes. Shazly *et al*⁸, Wani Fouzia *et al*¹⁰, Yeshigeta *et al*¹¹, reported pseudoexfoliation glaucoma in 30.31%, 38.3%, 28.5% respectively. In the present study pseudoexfoliation glaucoma was found in 35% of patients with pseudoexfoliation, which is comparable with the previous studies.

Type of cataract in pseudoexfoliation: Pseudoexfoliation is associated with increased incidence of nuclear sclerosis. H. Arvind *et al*⁷, reported nuclear sclerosis in 67.1%, Yeshigeta *et al*¹¹ reported nuclear sclerosis in 41%. In the present study nuclear cataract is seen in 60%, which is comparable with previous studies.

CONCLUSION

Pseudoexfoliation is a degenerative disease of basement membrane, which increases with the age, hence more commonly seen in older age group. Pseudoexfoliation initially starts as unilateral disease and progresses to other eye as the age advances. In the eye, the fibrillar pseudoexfoliative material is commonly seen at pupillary margins, anterior lens capsule and angle of anterior chamber. Pseudoexfoliation is associated with open angles and flakes of pseudoexfoliative material are seen in angle of anterior chamber on gonioscopy. Most common type of cataract associated with pseudoexfoliation is nuclear cataract. From this study we infer that all patients with pseudoexfoliation should be evaluated for glaucoma.

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