



PREVALENCE AND OCULAR MANIFESTATIONS OF PSEUDOEXFOLIATION SYNDROME AMONG PATIENTS SCHEDULED FOR MANUAL SMALL INCISION CATARACT SURGERY IN GMC RAJOURI

Ophthalmology

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ABSTRACT

Aim: To study the prevalence and ocular manifestations of Pseudoexfoliation syndrome (PXF) among patients scheduled for manual small incision cataract surgery in GMC Rajouri. **Material and methods:** In this cross-sectional study, patients with cataract scheduled for Manual small incision cataract surgery (MSICS) from December 2020 to December 2022 were screened for the presence of PXF. A thorough pre-operative evaluation was performed including slit lamp examination, gonioscopy, tonometry and funduscopy. Clinical and demographic profile of patients with PXF and the intra-ocular manifestations were recorded. **Results:** A total of 310 patients were evaluated. Of these, 90 patients (29.03%) had PXF syndrome. Fifty six patients (62.2%) were males and 34 (37.77%) were females. The mean age was 68 years (range 51-85 years) and majority (38.88%) was in the age group of 61 to 70 years. PXF prevalence was seen to be maximum in the age group 81 years and above (45%) and least in the 51 to 60 years group (20%). Morphologically, nuclear cataract was the most common type of cataract observed (32.22%) followed by cortical cataract with nuclear sclerosis (20%). PXF was seen in both eyes in 70% of patients, while unilateral involvement was seen in 30%. Mean pupillary dilation was 5.92 (± 1.25) mm, which was significantly lower than the non-PXF cohort (7.14 ± 0.35 mm, $P=0.000$). **Conclusion:** There is relatively higher prevalence of PXF in Rajouri and adjoining areas. Hence, it is important to diagnose the ocular manifestations of PXF syndrome in all patients, especially those posted for cataract surgery to ensure minimal complications and to achieve good post-operative visual outcome.

KEYWORDS

INTRODUCTION

Pseudoexfoliation (PXF) syndrome is a systemic disorder first mentioned in 1917 by Lindberg, a Finnish ophthalmologist and further described in 1923 by Alfred Vogt¹. It is clinically diagnosed by the presence of light gray flakes most noticeable on the pupillary margin and also seen on the lens surface, zonules, trabecular meshwork, hyaloid and endothelial surface of cornea.² The epithelial cells of the basement membrane of ciliary body, iris and lens epithelium produce the fibrillogranular material. Globally, the reported prevalence rate of PEX in patients scheduled for cataract surgery shows extensive variations in Ethiopia (39.3%),³ Estonia (35.4%),⁴ Finland (30.8%),⁵ Greece (28%),⁶ South Africa (26%),⁷ Portugal (25.3%),⁸ and Turkey (16.4%).⁹

The correct diagnosis of PXF is highly examiner-dependent. PXF syndrome often remains undiagnosed especially because of missing the early subtle signs. The importance of diagnosing PXF on routine ocular examination lies in the fact that it is associated with increased risk of complications during cataract surgery primarily due to two pathological manifestations, which are zonular weakness and poor dilatation of pupils. Such patients can have as high as five-time greater risk of intra-operative complications including posterior capsular rupture, vitreous loss, zonular dialysis, secondary cataract, capsular phimosis and corneal decompensation.¹⁰

A study by Scorolli *et al.* showed five times greater chance of intraoperative complications during cataract surgery in PXF eyes as compared to normal population.¹¹ Thus, it becomes necessary to diagnose this condition accurately during preoperative evaluation to be able to take appropriate measures such as use of pupil expanders, viscoelastic agents, and capsular tension ring (CTR) and techniques such as sphincterotomy which will lessen the complication rate.¹²

PXF is commonly seen in the elderly and is often accompanied by open and closed-angle glaucoma.¹³

The prevalence of PXF shows wide variation worldwide because of various factors like age, ethnic predisposition, geographical location, environmental factors, etc. Worldwide, higher prevalence rates of PXF syndrome have been found in Northern European, Scandinavian and Mediterranean region.¹⁴

Ethnic diversity in north India is well known.¹⁵ A study from extreme north India showed higher prevalence of 26.32% in patients scheduled for cataract surgery in camp patients in the Kashmir region.¹⁶ Since the geographic location and environmental factors predispose to PXF, it was important to find out prevalence rates in our state because such

significant prevalence rates warrant detailed slit lamp examination so that surgeons are better prepared to avoid any intra-operative complication and plan appropriate intra-operative and post-operative intervention in PXF eyes for better postoperative outcome.

MATERIAL AND METHODS:

This was a cross-sectional study carried out in the ophthalmology department of GMC Rajouri, Jammu. Patients who presented to the OPD with significant cataract and scheduled for manual small incision cataract surgery between December 2020 and December 2022 were included. The study was approved by the Institutional Ethics Committee and adhered to the tenets of the declaration of Helsinki. Written and informed consent was taken from all patients. Patients <50 years old, those with traumatic or complicated cataract, and history of previous ocular surgery were excluded. Detailed history was recorded and best-corrected visual acuity (BCVA) was measured using Snellen's chart. IOP was measured by non-contact tonometer. Slit lamp examination was performed for anterior segment evaluation and PXF deposits were noted on the pupillary margin, iris, anterior lens capsule and cornea before and after pupil dilation with 5% Phenylephrine + 0.8% Tropicamide. Cataract was graded according to Lens Opacities Classification System 3 (LOCS 3).

Statistical Analyses

Descriptive statistics were used to analyze the prevalence, demographic and clinical characteristics as well as the intra-ocular manifestations. Independent T-test was used to compare the mean pupillary dilation between the PXF and non-PXF cohort, as well as between eyes with PXF deposition on lens, pupillary margin or iris alone and those with PXF material on all three ocular structures combined. A P -value of ≤ 0.05 was considered as statistically significant. All statistical analyses were performed using the Statistical Package of Social Sciences (SPSS) v23.

Table -1 Age and sex distribution of patients with pseudoexfoliation

Age(years)	Sex		Number of patients with pseudoexfoliation (%)
	M	F	
51-60	8	8	16(17.77%)
61-70	19	16	35(38.88%)
71-80	24	6	30(33.33%)
81 and above	5	4	9(10%)
Total	56	34	90

Table- 2 Age group wise distribution of PFX patients to total number of patients

Age(years)	Number of patients with PFX	Total number of patients	Percentage of patients with PFX
51-60	16	80	20%
61-70	35	120	29.16%
71-80	30	90	33.33%
81 And above	9	20	45%
Total	90	310	

Table-3 Distribution of PFX in ocular structures

PFX material	Number of operated eyes(%)
Pupillary margin	26(28.8%)
Iris	8(8.8%)
Lens	29(32.2%)
Iris,Pupillary margin and lens	18(20%)
Pupillary margin and lens	9(10%)

Table-4 Maximum Pupillary Dilatation observed

Pupillary Dilatation	Number of operated eyes with PFX (%)
< 5mm(poor)	13(14.44%)
5-7(fair)	66(73.33%)
>7mm(good)	11(12.22%)

Table-5 Distribution of morphological type of cataract with PFX

Type of cataract	Number of operated eyes with PFX (%)
Hyperature	7(7.7%)
Mature	13(12.22%)
Cortical	8(8.8%)
Nuclear Cataract	29(32.22%)
Cortical & nuclear	18(20%)
Posterior subcapsular	10(11.11%)
Posterior subcapsular & nuclear	5(5.55%)

Table-6 Pre-operative intraocular pressure(IOP)

IOP (mmHg)	Number of operated eyes with PFX(%)
<10	4(4.4%)
11-15	48(53.33%)
16-20	32(35.55%)
21& above	6(6.6%)

Table-7: Pre-operative best corrected visual acuity

Best-corrected visual acuity	Number of operated eyes with PFX (%)
6/6-6/9	0
6/12-6/18	1(1.11%)
6/24-6/36	14(15.5%)
6/60 & less	75(83.33%)

RESULTS

Out Of the 310 patients screened, 90 were diagnosed with Pseudoexfoliation syndrome (prevalence of 29.03%).Fifty six patients (62.22%) were males and 34 (37.77%) were females. The mean age was 68 years (range 51-85 years) and majority (38.88%) was in the age group of 61 to 70 years. Age and sex-wise distribution has been depicted in table 1.

The number of patients in the age group of 81 years and above had the highest prevalence of PFX syndrome (45%), followed by 71-80 years group (33.3%). Age-group wise distribution of patients with PFX to total number of patients screened is shown in table 2.

PFX was seen in both eyes in 56(70%) patients, while 24(30%) had unilateral involvement. 10 patients had pseudophakia and hence laterality was not defined.

All clinical and intra-ocular characteristics have been described for the operated eye in all patients with PFX. PFX material was present on the lens in 29 (32.2%) cases and on the pupillary margin in 26 (28.8%) cases. Eighteen patients (20%) had PFX material on the lens, iris and the pupillary margin together. PFX material was present on the iris in 8 (8.8%) cases and lens and pupillary margin were involved together in 9 (10%) patients (Table 3)

Poor pupillary dilation (<5mm) was observed in 13 cases (14.44%). Pupillary dilation was fair in 73.33% cases (n=66) and 12.22% cases (n=11) had good dilation. Mean pupillary dilation was 5.92 (±1.25) mm , which was significantly lower than the non-PFX cohort (7.14±0.35 mm, $P=0.000$). Mean pupillary dilation in patients with PFX material distributed on the pupillary margin, iris and lens together

was 5 (±0.66) mm, whereas in patients with PFX material on lens and pupillary margin alone it was 6.32 (±1.2) mm and 5.83 (±1.2) mm, respectively. Patients with PFX material on the pupillary margin, lens and iris together had significantly lower pupillary dilation than those with PFX material on the lens alone ($P=0.014$). In patients with PFX alone on the iris, mean pupillary dilation was 7mm (Table 4).

Morphologically, nuclear cataract was the most common type of cataract observed (32.22%), followed by cortical cataract with nuclear sclerosis (20%). Distribution of morphological type of cataract is depicted in table 5.

The increased intraocular pressure was noticed in 6 eyes (6.6%) in our study. The mean intraocular pressure was 14.5 mm of Hg. Three patients each (3.3%) had open-angle glaucoma and lens-induced glaucoma (Table 6).

Pre-operative best-corrected visual acuity was recorded. Around 83.33% patients had visual acuity< 6/60. In 15.5 % cases, it was between 6/36 and 6/24 (Table 7).

DISCUSSION

The PEX occurs worldwide although reported prevalence rates vary extensively. Several prevalence studies have been conducted in other parts of India and neighboring Pakistan. The prevalence of PEX based on hospital reports from India varies between 1.87% and 13.5%.¹⁷ In this study, we observed a high prevalence of PFX syndrome among patients with cataract planned for MSICS. These prevalence rates are higher than those reported from south India (22.1%).¹⁸⁻¹⁹ In a hospital-based study from South India, the prevalence of PFX syndrome in patients scheduled for cataract surgery was 22.1% with a maximum prevalence of 35.8% in the age group of 81 years and above.¹⁹ Another population-based study from rural south India reported the prevalence rates of PFX as low as 3.8%.¹⁸

From the northwestern Himalayan region, limited data is available and very few studies on the prevalence of PFX syndrome in patients with cataract have been conducted. Sufi et al from the neighboring region of Kashmir reported a high prevalence rate of 26.32% among patients scheduled for cataract surgery in a camp. The authors attributed association of PFX with outdoor activity, environmental factors (solar radiation, UV exposure), ethnic origin and genetic factors²⁰. Moreover; this was a camp-based study in contrast to ours that was a hospital-based cross-sectional analysis, which could partly explain the relatively higher rates of PFX prevalence reported by the authors despite of the geographical and environmental similarities.

Geographical and environmental factors play an important role in PFX prevalence. The prevalence of PFX is known to increase with latitude shift away from the Equator.²¹ another important factor that affects the prevalence of PFX is solar radiation exposure.²² solar radiation increases in intensity as altitude increases. Outdoor activity also independently increases the solar exposure and this UV radiation cans upregulate the exfoliative material.

Cold weather can increase the precipitation of PFX on the structures surrounding the anterior chamber.²³

Pseudoexfoliation syndrome predominantly affects the elderly age group and cataract in majority of patients is also age-related. The association of PFX with ageing and blindness has public health implications for India, especially considering the burden of cataract as well as increased rate of complications of cataract surgery in patients with PFX syndrome. There is association between PFX and cataracts, possibly due to ocular ischemia and defective antioxidant mechanism. Moreover, cataracts appear sooner and progress quicker in these patients.

The prevalence of PFX increased with increasing age in our study population, which is in line with that reported in other studies. In a hospital-based study by Govetto et al., PFX syndrome was not reported in patients below 50 years posted for cataract surgery. Two patients (6.1%) between 50-60 years, 11 (7.3%) patients between 60-70 years, 83 (19.1%) between 71-80 years and 149 (31.7%) above 80 years had PFX syndrome.²⁴ Similar observations were noted by Al-Shaer et al in Yemen, wherein 10.1% patients between 41 and 50 years old and 28.8% were >81 years old had the syndrome.²⁵

In 2003, Arvind H et al studied the profile of PXF in a population-based study in rural south India. They observed significant increase in prevalence with age but no sex predilection. There was a significantly higher prevalence of cataract among people with PXF compared to those without PXF ($p=0.014$). Raised IOP was seen in 16.7% of people with PXF.¹⁸ We observed a male preponderance in our study population with PXF. This distribution is consistent with the observation of Pranathi et al. who, in their study of 52 patients observed 53.8% males and 46.2% females.²⁶ Lamba et al also reported a higher prevalence of PXF among males.²⁷ More than 70% of the patients in our study had bilateral involvement. Most studies have reported a predominantly bilateral involvement with PXF, as the unilateral disease more commonly progresses to a bilateral condition. In PXF, there is an initial unilateral involvement in 40 to 50% of patients that becomes bilateral within 5 years. Gelaw and Tibebe reported bilateral involvement in 66.7% patients in their study.²⁸

The association of PXF syndrome in patients of cataract can have an impact on surgical outcome. Therefore, it is of utmost importance to diagnose PXF in all patients especially those presenting with cataract so as to avoid complications and improve surgical outcome. There is lack of published data on PXF prevalence rates in North India. This study was conducted to analyze the prevalence of PXF syndrome in this north Indian state as majority of the risk factors proposed to be involved in the etiology of PXF syndrome are widespread in this region.

CONCLUSION

The prevalence of PXF in Jammu & Kashmir region is higher than other parts of the Indian sub-continent. It is important to be vigilant about PXF syndrome as a pre-operative diagnosis helps in avoiding various intra-operative complications, thus resulting in better surgical outcome in predisposed populations like that of our region.

REFERENCES

1. Tarkkanen A, Kivelä T, John G. Lindberg and the discovery of exfoliation syndrome. *Acta ophthalmologica Scandinavica*. 2002;80(2):151-4.
2. Lamba PA, Giridhar A. Pseudoexfoliation syndrome (prevalence based on random survey hospital data). *Indian J Ophthalmol* 1984; 32:169-73.
3. Tilikew T, Kefyalew R. Prevalence of pseudoexfoliation syndrome in Ethiopian patients scheduled for cataract surgery. *Acta Ophthalmol Scand* 2004; 82:253-8.
4. Kaljurand K, Paivi P. Exfoliation syndrome in Estonian patients Scheduled for cataract surgery. *Acta Ophthalmol Scand* 2004; 82:259-63.
5. Lumme P, Laatikainen L. Exfoliation syndrome and cataract extraction. *Am J Ophthalmol* 1993; 116:51-5.
6. Konstant AG, Dimitrakoulis N, Kourtizidion O, Filidis K, Bufidis T, Benos A. Frequency of exfoliation syndrome in Greek cataract patients. *Acta Ophthalmol Scand* 1996; 74:478-82.
7. Bartholomew RS. Pseudocapsular exfoliation in the Bantu of South Africa. II. Occurrence and prevalence. *Br J Ophthalmol* 1973; 57:41-5.
8. Alfaite M, Leite E, Mira J, Cunha-Vaz JG. Prevalence and surgical complications of pseudoexfoliation syndrome in Portuguese patients with senile cataract. *J Cataract Refract Surg* 1996; 22:972-6.
9. Sekeroglu MA, Bozkurt B, Ircek M, Ustunel S, Orhan M, Saracbası O. Systemic associations and prevalence of exfoliation syndrome in patients scheduled for cataract surgery. *Eur J Ophthalmol* 2008; 18:551-5.
10. N, Chen TC. Cataract surgery in pseudoexfoliation syndrome. *Seminars in ophthalmology*. 2014; 29(5-6):403-8.
11. Scroli L, Scroli L, Campos EC, Bassein L, Meduri RA. Pseudoexfoliation syndrome: A cohort study on intraoperative complications in cataract surgery. *Ophthalmologic* 1998; 212:278-80.
12. Pranathi K, Magdum RM, Maheshgauri R, Patel K, Patra S. A study of complications during cataract surgery in patients with pseudoexfoliation syndrome. *J Clin Ophthalmol Res* 2014; 2:7-11.
13. Ritch R, Schlötzer-Schrehardt U. Exfoliation syndrome. *Survey of ophthalmology*. 2001; 45(4):265-315.
14. Challa P. Genetics of pseudoexfoliation syndrome. *Current opinion in ophthalmology*. 2009; 20(2):88-91.
15. Basu A, Mukherjee N, Roy S, Sengupta S, Banerjee S, Chakraborty M, et al. Ethnic India: a genomic view, with special reference to peopling and structure. *Genome research*. 2003; 13(10):2277-90.
16. Sufi A, Mufti A, Nazir N, Qureshi T, Ramzan R. Prevalence of pseudoexfoliation syndrome in patients scheduled for cataract surgery in eye camps in Kashmir. *Journal of Clinical Ophthalmology and Research*. 2014; 2(3):137-9.
17. Thomas R, Paul P, Muliyl J. Glaucoma in India. *J Glaucoma* 2003; 12:81-7.
18. Arvind H, Raju P, Paul PG, Baskaran M, Ramesh SV, George RJ, et al. Pseudoexfoliation in South India. *The British journal of ophthalmology*. 2003; 87(11):1321-3.
19. Joshi RS, Singanwad SV. Frequency and surgical difficulties associated with pseudoexfoliation syndrome among Indian rural population scheduled for cataract surgery: Hospital-based data. *Indian Journal of Ophthalmology*. 2019; 67(2):221-6.
20. Sufi A, Mufti A, Nazir N, Qureshi T, Ramzan R. Prevalence of pseudoexfoliation syndrome in patients scheduled for cataract surgery in eye camps in Kashmir. *Journal of Clinical Ophthalmology and Research*. 2014; 2(3):137-9.
21. Kang JH, Wiggs JL, Pasquale LR. Relation between time spent outdoors and exfoliation glaucoma or exfoliation glaucoma suspect. *American journal of ophthalmology*. 2014; 158(3):605-14.
22. Pasquale LR, Jiwani AZ, Zehavi-Dorin T, Majd A, Rhee DJ, Chen T, et al. Solar exposure and residential geographic history in relation to exfoliation syndrome in the United States and Israel. *JAMA ophthalmology*. 2014; 132(12):1439-45.
23. Jiwani AZ, Pasquale LR. Exfoliation Syndrome and Solar Exposure: New Epidemiological Insights Into the Pathophysiology of the Disease. *International ophthalmology clinics*. 2015; 55(4):13-
24. Govetto A, Lorente R, Vázquez de Parga P, Rojas L, Moreno C, Lagoa F, et al. Frequency of pseudoexfoliation among patients scheduled for cataract surgery. *Journal of cataract and refractive surgery*. 2015; 41(6):1224-31.s
25. Al-Shaer M, Bamashmus M, Al-Barrag A. Point prevalence of pseudoexfoliation syndrome in patients scheduled for cataract surgery in eye camps in Yemen. *Middle East African journal of ophthalmology*. 2010; 17(1):74-7.
26. Pranathi K, Magdum R, Maheshgauri R, Patel K, Patra S. A study of complications during cataract surgery in patients with pseudoexfoliation syndrome. *Journal of Clinical Ophthalmology and Research*. 2014; 2(1):7-11.
27. Lamba P, Giridhar A. Pseudoexfoliation syndrome. *Indian Journal of Ophthalmology*. 1984; 32(3):169-73.
28. Gelaw Y, Tibebe Y. Clinical characteristics of cataract patients with pseudoexfoliation syndrome at Jimma University specialized hospital, South West Ethiopia. *Ethiopian journal of health sciences*. 2012; 22(1):1-6.