PSEUDOEKSOFILJATION: A STUDY IN RURAL POPULATION AROUND HYDERABAD
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HOW TO CITE THIS ARTICLE:

ABSTRACT: CONTEXT: Pseudoxofiatiom is an inherited microfiibrilipathy with public health implication in India, due to its association with age, increased risk of glaucoma and higher incidence of intraoperative (especially difficulty in mydriasis) and postoperative complications of cataract surgery. AIMS: To determine age, sex, Body Mass Index correlation, laterality and intraocular pressure at presentation and effect of mydriasis in patients with pseudoxofiatiom. To estimate the prevalence of glaucoma in pseudoxofiatiom patients. SETTINGS AND DESIGN: The study is a cross-sectional observation of patients attending the ophthalmology outpatient department at Bhaskar Medical College, Moinabad over a period of 6 months. 38 consecutive patients (and 48 pseudoxofiatiom eyes) who fit the inclusion and exclusion criteria were included. METHODS AND MATERIAL: A clinical profile sheet was used to obtain patient information and relevant history of present and past complaints. Recording of height and weight was done, as was visual acuity estimation and examination of anterior segment. Goldman applanation tonometer was used to record intraocular pressure and evaluation of the angle by a four mirror gonioscope. Pupil size was measured before and after the use of 1 drop of 5% w/v phenylephrine and 0.8% w/v tropicamide. RESULTS: Pseudoxofiatiom was found to be most common in the 60-69 years age group (55.26%), followed by 70-79 years (21.05%). Males (63.15%) were found to have higher incidence. The majority of patients (68.42%) were found to have Body Mass Index in the range of 18.5-24.9, classified as normal. 73.68% of patients had unilateral presentation. Most pseudoxofiatiom eyes (72.91%) showed mydriasis in the range of 6-8 mm. 6.25% patients were diagnosed glaucomatous and 10.41% had ocular hypertension. CONCLUSIONS: 1. Pseudoxofiatiom syndrome is an age-related microfiibrilipathy, with incidence increasing with age. 2. Males had higher incidence of pseudoxofiatiom, consistent with Indian studies. 3. There was no observed higher incidence of pseudoxofiatiom in those with lower body mass index. 4. At presentation, pseudoxofiatiom syndrome was largely unilateral. 5. Most pseudoxofiatiom eyes showed difficulty in mydriasis, consistent with literature. 6. Association of glaucoma and ocular hypertension with pseudoxofiatiom eyes was consistent with studies. KEYWORDS: Pseudoxofiatiom syndrome, Clinical profile, Body mass index, Mydriasis, Glaucoma.

INTRODUCTION: Pseudoxofiatiom syndrome (PEX) is also known by its synonyms- senile exfoliation, senile uveal exfoliation, iridociliary exfoliation, or simply exfoliative syndrome.¹

PEX is an age related inherited microfiibrilipathy associated with polymorphisms in LOXL1 gene at locus 15q22, which codes for elastin of the extracellular matrix.² An imbalance between matrix metalloproteinases and tissue-inhibitors of matrix metalloproteinases has also been implicated.³ This results in generalized abnormal elastin metabolism, in the eye and in tissues throughout the body.
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The abnormal protein is observed as grey-white dandruff-like flakes deposited on various structures of the anterior segment, particularly the cornea, iris, trabecular meshwork, anterior surface of the lens and the zonules. It may also be seen over the posterior chamber intraocular lens in pseudophakic eyes and over the anterior hyaloid face in aphakic eyes.

The exfoliative material has multifocal origin- anterior lens epithelium, iris, ciliary epithelium, corneal endothelium, Schlemm canal endothelium, conjunctiva and ocular and orbital vessels. Extrabulbar (extraocular muscles, orbital septa, posterior ciliary vessels) and extraocular (lung, heart, liver, gall bladder, kidney, skin and meninges) sites of origin have also been implicated.

Prevalence of PEX varies with variables such as age, sex, and geographical distribution. The association of PEX with aging and blindness has public health implication in India (especially considering the pre-existing burden of cataract), because of higher incidence of cataract in PEX patients. In addition, cataract surgery in eyes with PEX has higher incidence of intra and postoperative complications. These include difficulty in mydriasis, intra-operative bleeding, posterior capsular rupture, zonular dehiscence, vitreous loss, posterior capsular opacification and intraocular lens decentration. This is further complicated by the increased risk of glaucoma among PXF patients.

In India, various studies have reported the prevalence of PEX in the range of 0.69 - 6%. Here at Bhaskar General Hospital, we see a fair number of cases of PXF. Since the prevalence of pseudoexfoliation varies with patient variables and geographical distribution, this study hopes to correlate these variables to PEX among the local population.

MATERIALS AND METHODS:

1. Subjects: The study population included 38 consecutive patients and 48 eyes, in whom a diagnosis of PEX has been made. Consenting subjects, who fit the inclusion and exclusion criteria, were recruited from those attending ophthalmology OPD of Bhaskar General Hospital. The period of study was 6 months.

2. Inclusion Criteria:
   - Patients who provide informed consent.
   - Patients in whom a diagnosis of PEX has been made by slit lamp biomicroscopy (diagnosis made either at presentation or as noted from past medical records).
   - Patients above the age of 40 years, of either sex diagnosed as PEX.

3. Exclusion criteria:
   - Patients with history of exposure to intense infrared lights (like glass blowers).
   - Patients with history of ocular trauma.
   - Patients with history or evidence or uveitis.

4. Methods:
   - A population based prospective cross sectional study over a period of 6 months.
   - A clinical profile sheet will be used to obtain patient information, history of present and past symptoms, treatment and family history. In addition, history of systemic illnesses and personal habits of the patient will be recorded.
The following examination will be done:

- Height.
- Weight.
- Manual recording of blood pressure using a sphygmomanometer.
- Visual acuity by Snellen chart (distance vision) and Jaeger chart (near vision).
- Subjective estimation of refractive error, if any.
- Objective estimation of refractive error, if any, by an autorefractometer.
- Examination under diffuse light for external eye pathology and pupillary reflexes.
- Slit lamp examination of anterior segment (before and after use of mydriatic - 1 drop of 5% w/v phenylephrine and 0.8% w/v tropicamide).
- Intraocular pressure measurement by applanation tonometry, using Goldmann tonometer mounted on a slit lamp. 0.5% w/v proparacaine drops will be used for surface anaesthesia, along with fluorescein strips to stain the tear film.
- Evaluation of the angle by a four mirror gonioscope, with a lubricating jelly as coupling fluid.
- Structural analysis of optic nerve head by direct ophthalmoscopy and use of a 90D lens.
- In patients in whom glaucoma is suspected, a visual field analysis was done by perimetry.

RESULTS:

1. Age: The 38 patients observed were 50-80 years of age, with the individual break up as follows:
   - 40-49 years: None
   - 50-59 years: 6 patients (15.78%)
   - 60-69 years: 21 patients (55.26%)
   - 70-79 years: 8 patients (21.05%)
   - 80 or more: 3 patients (7.89%)

These results are represented in Table 1.
2. **Sex:** Study showed higher incidence of pseudoexfoliation in males.
   Males: 24 patients (63.15%)
   Females: 14 patients (36.84%)
   These results are represented in Table 2.

![Table 2: Number of Patients by Sex](image)

3. **Body Mass Index (BMI):** Patient height and weight was recorded, BMI calculated and categorization made according to World Health Organization.
   - <18.5 (Underweight): 11 patients (28.94%)
   - 18.5 - 24.9 (Normal): 26 patients (68.42%)
   - 25 - 29.9 (Overweight): 1 patient (2.63%)
   - >30 (Obese): None
   These results are represented in Table 3.

![Table 3: Number of Patients by BMI](image)
4. Laterality at Presentation: The majority of the patients observed showed unilateral pseudoexfoliative evidence.
Unilateral: 28 patients (73.68%).
Bilateral: 10 patients (26.31%).
These results are represented in Table 4.

5. Intraocular Pressure: Applanation tonometry was done for 48 eyes, with the following results:
- <18 mm Hg: 31 eyes (64.5%)
- 18-21 mm Hg: 9 eyes (18.75%)
- >21 mm Hg: 8 eyes (16.66%)

Out of the 8 eyes with intraocular pressure more than 21 mm Hg, one was diagnosed open angle glaucoma, two as closed angle glaucoma and the remaining five as ocular hypertension.
These results are represented in Table 5.
6. **Effect of Mydriatic:** The size of pupil after use of mydriatic - 1 drop of 5% w/v phenylephrine and 0.8% w/v tropicamide - was observed in 48 eyes.  
4-6 mm: 5 eyes (10.41%).  
6-8 mm: 35 eyes (72.91%).  
>8 mm: 1 eye (2.08%).  
Dilation not done (patient not willing/contraindicated): 7 eyes (14.58%).  
These results are represented in Table 6.

**DISCUSSION:** In 1999, Blue Mountains Eye Study reported a prevalence of PEX in 2.3% subjects, and that both prevalence and bilaterality of the diseases increased with age. Glaucomatous damage was present in 14.2% of eyes with PEX compared with 1.7% of eyes without PEX (age and sex adjusted Odds Ratio). Ocular hypertension was also more frequently found to be associated in eyes with PEX (9.3%) than in eyes without (3.1%).

In 2003, a study of PEX among rural population of South India was done. The study reported prevalence of PEX at 6.0%. Prevalence increased with age (p<0.01) and was greater in males (p=0.01). The prevalence of glaucoma among those with PEX was 7.5%. On multivariate analysis, increasing age and male gender were significantly associated with PEX.

Blue Mountains Eye Study estimated the prevalence of PEX in the general population at 2.7% and Framingham study at 1.8%, with the age-wise prevalence found to be maximum in the seventh to ninth decades of life.

A 2007 study in Iceland, PEX was observed to be an age related phenomenon, associated with elevated IOP and was more commonly found in women than men.

In 2011, a study by Tarek A Shazly et al reported prevalence of pseudoexfoliation among upper Egyptian individuals of 40 years and older to be 4.14%. This rate is similar to other studies conducted in South India and the Blue Mountains Eye Study. It also showed increased association with glaucoma (30.3%), cataract (65%) and hearing loss (8.1%).
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The latest study was done in 2013, in a rural Central Indian population. The PEX prevalence (mean 1.49 +/- 0.18%) among those 30 years and older was significantly associated with older age, lower Body Mass Index and higher diastolic BP. There was no significant association with diabetes mellitus, smoking or dyslipidemia.23

A study was done in South India in 2005 (Andhra Pradesh Eye Disease Study) in which the age-gender-area-adjusted overall prevalence of PEX was 0.69%. The prevalence was found to be higher with increasing age (3.01% in 40 years and above, and 6.28% in 60 years and above).24 The association of pseudoexfoliation observed with increasing age is consistent with the above studies.

PEX has been found to be more common in women, with Allingham and associates establishing an X-linked inheritance.25 Indian studies have, however, reported higher incidence in males and the same was observed in this study. The difference could possibly be explained by the difference in attitudes of seeking medical attention.

There was no observed association with low Body Mass Index in this study.

At detection, PEX has been reported to be unilateral in one third to half patients, while 14-43% become bilateral over 5-10 years.26,3 In this study, the incidence of unilaterality at presentation was found to be higher.

The difficulty in mydriasis of pseudo exfoliative eyes observed was consistent with studies. PEX is also the most identifiable cause of open angle glaucoma worldwide.27 The pathology lies in the exfoliative material getting deposited in the trabecular meshwork and obstructing the outflow of aqueous humor. Blue Mountains Eye Study has estimated the prevalence of glaucoma among PEX patients at 6-7%, and in an additional 15% there is only an elevated IOP.28,29

Among the PEX patients with IOP in the normal range, 3-15% have been found to develop glaucoma over 3-15 years.3,8,28 Based on this, keeping the patients with IOP in the high normal range (18-21 mm Hg) under follow up would help in the early detection of development of glaucoma.

The association with glaucoma and elevated IOP observed in this study are consistent with the above mentioned study.

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ACKNOWLEDGEMENTS: To the staff of Ophthalmology Department at Bhaskar Medical College: Dr. Tulasi, Assistant Professor, Dr. Madhura, Senior Resident, Dr. Irfan, Senior Resident, To the technical staff working in the Ophthalmology OPD.

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Date of Submission: 05/08/2015.
Date of Peer Review: 06/08/2015.
Date of Acceptance: 08/09/2015.
Date of Publishing: 21/09/2015.