

PREDICTORS OF VISUAL IMPAIRMENT IN PSEUDOEXFOLIATION SYNDROME AND PSEUDOEXFOLIATION GLAUCOMA IN NORTH EAST INDIA- A HOSPITAL BASED STUDY

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ABSTRACT

Purpose: To identify predictors of visual impairment in pseudoexfoliation syndrome (PXF) and exfoliative glaucoma (PXG).

Methods: Retrospective review of records of patients seen by a single clinician at our glaucoma services between April 2011-March 2012. Data collected included age, sex, unilateral or bilateral presentation, baseline intraocular pressure (IOP) and best corrected visual acuity, prior medical consultation or treatment, presence or absence of cataract, cup disc ratio (CDR), gonioscopy, other ocular pathology or systemic associations, mean deviation and pattern standard deviation. Logistic regression was used to identify predictors of poor visual acuity with all the above mentioned variables as independent variables in pseudoexfoliation syndrome and pseudoexfoliation glaucoma.

Results: Of 708 patients seen at the glaucoma services seen by a single clinician, 37 patients with complete available data were included with a mean age of 66 ± 8.5 years (50-80years), including 3 unilateral and 35 bilateral pseudoexfoliation. While 44% of all eyes had a visual acuity better than 20/60, 56% had a visual acuity $<20/200$. Nine eyes with exfoliative glaucoma were irreversibly blind at presentation. Among those with high IOP, 53% had visual acuity $<20/200$. Multivariate logistic regression identified baseline IOP, lack of prior treatment and cup disc ratio as predictors for worse visual acuity in PXG with age, lack of prior treatment and cataract as predictors for worse visual acuity in PXF.

Conclusions: While increasing age and cataract predict poor visual acuity in pseudoexfoliation syndrome, a higher baseline IOP and worse cup disc ratio predict poor visual outcomes in exfoliative glaucoma.

KEYWORDS: Pseudoexfoliation syndrome, Exfoliative glaucoma, Blindness;

METHODS

A retrospective review of database records of patients attending glaucoma services seen by a single clinician (APR) was done for the period between April 2011-2012. The study was approved by the institutional review board. Patients >40 years with unilateral or bilateral pseudoexfoliation with or without glaucoma were included for this study.

Pseudoexfoliation syndrome in our hospital is diagnosed in adults >40 years with clinically evident pseudoexfoliation like PXF material or radial pigment lines over lens, pupillary ruff with or without poor dilatation IOP>21mm Hg <32mm Hg at any visit with no disc or field damage and no evidence of glaucomatous optic nerve damage or visual field defects. Exfoliative glaucoma included adults >40 years with above features along with evidence of glaucomatous optic nerve head damage (focal notch, disc haemorrhage, retinal nerve fibre layer defects or vertical cup disc ratio>0.7 or asymmetry of >0.2) and repeatable field defects corresponding to disc damage.

Data records of patients identified from the database were screened for completeness of data available. Data that were collected included age, sex, diagnosis, baseline IOP Goldmann applanation tonometry, cup disc ratio assessed by +90D fundus biomicroscopy, Snellens visual acuity, prior medical consultation or treatment, presence or absence of cataract, cup disc ratio, gonioscopy, other ocular pathology or systemic associations, mean deviation and pattern standard deviation.

STATISTICS

Descriptive statistics included mean and standard deviation for normally distributed variables, median and range for non-normally distributed variables. The student “t” test was used to assess differences in variables among PXF and PXG. Univariate and multivariate logistic regression model was used to assess the factors predicting poor visual acuity. Statistical analyses were performed using commercial softwares (Stata ver. 10.0; StataCorp, College Station, TX). The alpha level (type I error) was set at 0.05.

RESULTS

Of 708 patients seen at the glaucoma services by a single clinician during the specified period, 153 identified with pseudoexfoliation were included of which 102 patients with incomplete data were excluded from the analysis. Twelve eyes with associated corneal abnormalities like corneal ulcer or traumatic scars, retinal detachment confounding the analysis were excluded.

Seventy six eyes of 38 patients with complete data were included for the final analysis which included 30 males and 8 females with a mean age of 66 ± 8.5 years (50-80years). Of 38 patients, 3 were unilateral with apparently uninvolved fellow eye with no evident PXF material, normal optic nerve and visual field while 35 were bilateral cases.

Exfoliative glaucoma was found in 48 of 76 eyes (60%) which included 21 patients with bilateral pseudoexfoliation. Of all patients 41 eyes with PXG (53%) and 30% with PXF were from higher socioeconomic strata. Of these, 76% had never sought prior medical consultation, which included 31 eyes with PXG. Of 10 eyes (all bilateral cases) under treatment at initial presentation, 8 were on two or more topical medications while 2 eyes were on monotherapy.

The mean cup disc ratio in PXF group was 0.4 ± 0.03 while that in the PXG was 0.8 ± 0.02 , $p<0.001$. Among PXG, 89% of eyes had a cup disc ratio >0.6 and 56% of these had a cup disc ratio >0.8.

While 44% had a visual acuity better than 20/60, 56% had a visual acuity $<20/200$. Among those with pseudoexfoliation syndrome, 8 of 30 eyes had visual acuity $<20/60$ compared to 32 of 46 eyes with PXG, $p=0.05$. Nine eyes with exfoliative glaucoma were irreversibly blind at presentation (including 4 aphakic and 5 pseudophakic eyes) while 4 eyes with total cataract had light perception at presentation. The visual acuity was worse in bilateral cases than unilateral cases though this did not reach statistical significance, $p=0.06$. There was no difference in the visual acuity between the higher & lower socioeconomic groups, $p=0.8$. Those who were on treatment had poor visual acuity than the ones who sought first time advice, $p<0.001$.

The baseline IOP in the two were statistically significant, $p<0.001$ though both groups were age matched, $p=0.08$. Pseudoexfoliation syndrome eyes had a maximum IOP of 21 mm Hg while those with PXG had a maximum treated IOP of 46mm Hg. Among those with high IOP, 53% had visual acuity $<20/200$ which included 9 eyes with no perception of light.

On univariate analysis, age, CDR, BIOP, lack of prior treatment or consultation, presence or absence of glaucoma and cataract were significant predictors while laterality, presence of ocular or systemic associations were not found to predict visual acuity in pseudoexfoliation syndrome or glaucoma. Multivariate logistic regression identified baseline IOP, lack of prior treatment and CDR as predictors for worse visual acuity in PXG with age, lack of prior treatment and cataract as predictors for worse visual acuity in PXF, Table 2.

DISCUSSIONS

The purpose of this study was to evaluate the predictors of poor visual acuity in patients with pseudoexfoliation and exfoliative glaucoma. This was a hospital based cross sectional study diagnosed by a single clinician which ensured a correct diagnosis and avoided bias due to multiple observers. It may be argued that those excluded for lack of complete data, other observers or other confounding factors may have caused underestimation of blindness and poor visual acuity in this study. Yet, to ensure proper selection of representative cases, it was essential to select only those with complete data of patients seen by a single clinician.

Pseudoexfoliation is a known risk factor for high postoperative complications. Complicating factors such as poor mydriasis, zonular weakness, corneal endothelial dysfunction, higher rate of vitreous loss, capsular phimosis, and opacification have all been reported after cataract surgery.¹⁻⁴ Several reports have elucidated its various ocular and systemic associations; yet no study has looked into the causes of poor vision in PXf vs PXG though both are potentially blinding conditions due to different reasons.

Cataract is an increasingly common cause of global blindness, particularly in developing countries with an aging population and insufficient health care resources.⁶⁻⁹ Age-related cataract is the leading cause of blindness in Asia. Cataract is a frequent association of pseudoexfoliation.^{2,3,4,10} In this study, 12 of 30 PXF and 20 of 46 eyes with PXG had a visual acuity $<20/60$. Multivariate logistic regression identified age, lack of prior treatment and cataract as predictors for worse visual acuity in

PXF, which constitutes preventable blindness. One group identified that of subjects with PXF, 25.7% remained bilaterally blind after best correction; 89.3% of this bilateral blindness was the result of cataracts.¹¹ Reasons for high rates of cataract blindness include lack of resources, cost, remoteness, lack of awareness of available treatment, fatalism, and fear of surgery. Yet, only 10 were on treatment at presentation while others had never sought prior medical consultation. Though this hospital based survey may not reflect the effectiveness and reach of true community based programmes, the fact that most of the patients in the study had never sought medical help before only points towards the need for better screening methods in the aged people.

Approaches to dealing with blindness in India have focused primarily on cataract services, including increasing cataract surgical output because of its high prevalence.^{6,7} Studies on pseudoexfoliation also have focused primarily on the postoperative complications or its prevalence worldwide. Although it occurs in virtually every area of the world, a considerable racial variation exists.¹¹⁻²⁰ Framingham study showed that the prevalence of PXF was 1.8%.¹⁵ In another study of subjects over 60 years in various ethnicities, prevalence rates ranging from 0% in Greenland Eskimos to 21% in Icelanders were noted.¹² Prevalence rates of as low as 0% in Eskimos, and as high as 38% in Navajo Indians were reported.¹³ Though various differences exist in the prevalence due to environmental differences, no other studies have evaluated causes of poor visual acuity in pseudoexfoliation. If the prevalence of PXF can be so high and its association with cataract is reported strongly, elucidation of the predictors for poor vision in this entity also deserves focus.

Pseudoexfoliation progresses to exfoliative glaucoma over a period time and several risk factors have been identified for progression.¹⁻³ Unlike cataract or refraction, blindness due to glaucoma cannot be reversed once it occurs. Many of these eyes with glaucoma blindness might have been saved if community screening includes identifiable features if this special entity like exfoliative material over pupillary ruff and on lens. In this study, >50% had a visual acuity <20/200 and 9 eyes with exfoliative glaucoma were blind on presentation.

One of the limitations of this study is being a hospital-based rather than a population-based study apart from the limitations of a retrospective study design. Under estimation of the prevalence of PXF and or co-morbidities associated with PXF may be attributed to the hospital based nature of the study. Also exclusion of patients with incomplete data like lack of visual fields may also have led to underestimation of the true visual impairment burden. A prospective design may also have identified the type of cataract leading to maximum visual impairment in this entity.¹⁶ In conclusion, age and cataract were the predictors of poor visual acuity in this study while those with a higher cup disc ratio and baseline IOP predicted poor vision in PXG. The high prevalence of pseudoexfoliation and exfoliative glaucoma in different populations suggests the need for effective screening measures for pseudoexfoliation and organized community based programs and training in identifying this specific entity.

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APPENDICES

Table 1: Clinical Characteristics of Patients with Pseudoexfoliation (PXF) and Exfoliative Glaucoma (PXG)

	PXF	PXG	P value*
	Mean ±SD	Mean ±SD	
Age(years)	64±9.5	67±7.6	0.2
CDR	0.5±0.2	0.8±0.1	<0.001
IOP(mm Hg)	14±2.4	24±9.7	<0.001
MD(dB)	-2.1±2.3	-17±11.2	<0.001
Best corrected Snellens visual acuity			
>20/60	18	16	0.8
20/60-20/200	4	9	0.02
<20/200	4	23	0.001

CDR-Cup disc ratio, IOP-Intraocular pressure, MD-Mean Deviation

Table 2: Multivariate Logistic Regression with Odd's Ratio (OR) Evaluation Predictors of Poor Visual Acuity in Pseudoexfoliation (PXF) and Exfoliative Glaucoma (PXG).

	OR		95%CI		P value	
	PXF	PXG	PXF	PXG	PXF	PXG
Age	1.1	0.9	1.03-1.3	0.9-1	0.01	0.8
Cataract	1.5	0.9	1-1.8	0.6-1.6	0.02	0.1
Prior Treatment	1.1	2.8	1.0-1.3	0.6-1.2	0.009	0.01
BIOP	1.0	1.04	0.6-1.1	0.9-1.1	0.4	0.02
CDR	0.9	1.1	0.8-1.4	0.9-1.6	0.6	0.01

CDR-Cup disc ratio, BIOP-Baseline Intraocular pressure, MD-Mean Deviation