

Prevalence of Exfoliative Glaucoma among Kashmiri Population: A Hospital Based Study

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Abstract:

Background: The Prevalence of exfoliative glaucoma has shown extensive variation all over world ranging from 0 to 50%.

Objective: To know the prevalence of exfoliative glaucoma in Kashmir.

Methods: A hospital based cross-sectional study was conducted from January 2006 to January 2007 on 300 patients with documented raised intra ocular pressure (IOP), glaucomatous changes in the fundus and open angle of anterior chamber.

Results: The study included 236 males and 64 females. Out of 300 patients, 115 had exfoliative glaucoma and among those left eye was involved in 47 patients, right eye in 31 and 37 had bilateral involvement. The patients above 60 years of age were found to have this condition more frequently as compared to those below 60 years of age. Occupation of patients had a strong association with this condition, as the disorder was seen more commonly in patients engaged in outdoor activities. The patients with exfoliative glaucoma were found to be having less Visual acuity; a higher IOP at presentation and a more severe and early optic nerve head involvement as compared to those with open angle glaucoma.

Conclusions: The study reveals that prevalence of exfoliative glaucoma as seen in our OPD based cross sectional study was found to be 38.3%. This prevalence was high as compared to prevalence studies conducted in southern parts of the country and low as compared to the studies conducted in the Scandinavian countries. The difference in the prevalence of the condition was probably in part related to the differences in the climatic conditions, ethnic origin and in part related to genetic factors of the studied population.

Key Words: Exfoliation glaucoma, prevalence, cross sectional study

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Introduction

Glaucoma is a leading cause of irreversible blindness throughout the world. WHO statistics, 1997, indicate glaucoma accounts for 15% of total global blindness (after cataract 43%).⁽¹⁾

Exfoliation Syndrome (XFS) is characterized by the production and progressive accumulation of a fibrillar extracellular material in many ocular tissues. It leads to both open angle glaucoma and angle - closure glaucoma, and has been causatively associated with cataract, lens dislocation, and central retinal vein occlusion. Based on the identification of accumulations in orbital tissues, skin specimens, and visceral organs, XFS appears to be a generalized disorder of the basement membrane in epithelial cells and has wide distribution throughout body.⁽²⁾

XFS occurs worldwide although reported prevalence rates vary extensively. This reflects a combination of the differences due to racial, ethnic or other as yet unknown reasons; the age and sex distribution of patients or population group examined; the clinical criteria used to diagnose XFS; the ability of the examiner to detect early stages; the thoroughness of the examination; and the awareness of the observer.⁽³⁾

In Scandinavia, where XFS was first described, the highest rates in studies of persons over age 60 have been reported from Ice-Land (about 25%) and Finland (over 20%).⁽⁴⁾ Rates in Norway and Sweden averages half of these while those in Denmark have been reported to be much less.⁽⁵⁾

Glaucoma occurs more commonly in eyes with XFS than in those without it. Elevated intraocular pressure (IOP) with or without glaucomatous damage occurs in approximately 25% of persons with XFS, or about 6 to 10 times the rate in eyes without XFS. The reported mean age of exfoliation syndrome patients ranges from 69 to 75, and most epidemiological surveys demonstrate an increasing prevalence with increasing age. Exfoliation glaucoma has a more serious clinical course and worse prognosis than primary open angle glaucoma.⁽⁶⁾ There is a significantly higher frequency and severity of optic nerve damage at the time of

diagnosis, worse visual field damage, poor response to medications, more severe clinical course, and more frequent necessity for surgical intervention.⁽⁷⁾

Methods

The study was conducted at the SMHS Hospital, Government Medical College (GMC), Srinagar (India). The centre is a tertiary level eye care centre and caters to all referred ophtho patients of the valley.

Period of study: January 2006 to January 2007.

Sample Design

Sampling unit: Eye is taken as sampling unit. The total of 600 eyes (300 consecutive patients) with established glaucoma who attended eye OPD of Government Medical College Srinagar (GMC) Srinagar was subjected to detailed clinical study.

Study Design

Cross sectional, prospective study:

Relevant clinical examination was done in all patients with established glaucoma, findings recorded at one point of time. No follow up of findings of the patients were included in this study.

The instruments used for examination were Slitlamp Bio microscope (Zeiss), Direct Ophthalmoscope (Heinz), Applanation Tonometer and Goldman Three Mirror Goniolens.

Inclusion Criteria

Patients with raised IOP, typical glaucomatous changes in fundus and open angle of anterior chamber.

Exclusion Criteria

Other documented causes of glaucoma like: Steroid induced glaucoma, Angle recession glaucoma, congenital glaucoma, Glaucoma associated with developmental disorders and Inflammatory Glaucoma.

Data Collection

Data was collected using a proforma.

Demographic data included name, age, gender, occupation, residence. Clinical history and complete ocular examination was done at the same time recording patient's visual acuity which was taken at a distance of 6m with Snellen Chart for literate patients and E-Chart for illiterate patients. Condition of conjunctiva, cornea, Anterior Chamber depth, iris details, pupillary reactions and lenticular changes

were noted down using diffuse illumination and slit illumination with a slit lamp.

Presence of exfoliation material along pupillary border and anterior lens surface was looked for with the help of Slit lamp under full mydriasis.

Condition of optic disc regarding cupping, NRR, vascular status was noted down with the help of direct ophthalmoscope as well as slit lamp biomicroscopy with 78D and 90D lens.

IOP was recorded with applanation tonometer using 1% fluorescein strips.

Finally gonioscopy was done with the Goldmans goniolens for the presence of increased pigmentation and or exfoliative material on the anterior chamber angle.

Statistical Analysis

Data collected was subjected to different statistical tests using SSPS. $P < 0.05$ was taken as significant.

Observations

Out of 300 patients with established glaucoma 236 were males and 64 were females. It was observed in our study that 6 patients (2 %), 3 males and 3 females, were below 40 years of age. 100 patients (33.3 %) , 81 males and 19 females, were between 40 to 60 years of age and 194 (64.7 %), 152 males and 42 females, were above 60 years of age.

The observations as shown in Table 1 indicate majority of patients having vision of less than 6/60 in right and left eye.

Right eye fundus picture of studied cases showed that CDR (cup-disc ratio) of 0.4 to 0.8 was present in 149 (49.8 %) cases and glaucomatous optic atrophy (GOA) was present in 79 (26.4 %) patients. Left eye fundus picture suggested that CDR of 0.4 to 0.8 was present in 112 (37.3 %) patients. GOA was present in 112 (37.3 %) patients (Table 2). IOP at presentation was normal in 100 patients in right eye and 98 in left eye suggesting that normal tension glaucoma (NTG) cases were accounting about 1/3rd of the total studied cases. IOP was greater than 40 mmHg in 17 right eyes and 16 left eyes.

In our study total number of patients with exfoliative glaucoma were 115 giving total prevalence of 38.3% in this study. Right eye PEX (pseudoexfoliation) glaucoma was present in 31 (26.95 %) patients, left eye PEX glaucoma was present in 47 (40.86 %) patients and 37 (32.17 %) patients were having bilateral involvement (Table 3). Seventythree percent of patients with exfoliative glaucoma were above 60 years of age (Table 4). Data was analysed statistically and the difference was found to be significant ($p < 0.05$) suggesting that this disease is an age related condition as majority of patients fall in greater than 60 years age group.

In patients with PEX glaucoma 67% of patients were unskilled occupation wise, most of them being farmers and labourers involving outdoor activities suggesting role of occupation in causation of this disease process. Only 13.9% of patients were professionals with indoor activities (Table 5)

Among PEX glaucoma patients 92 (80%) were male and 23 (20%) were females giving male female ratio of 4:1. Statistical analysis of the data showed an insignificant difference between males and females, when comparison was made with OAG (Open Angle Glaucoma), without PEX patients (Table 6).

Visual acuity of patients with PEX glaucoma showed majority of patients with visual acuity less than 6/60 (Table 7).

Patients with PEX glaucoma showed that 44.2% of patients had IOP greater than 30mmHg in right eyes and 53.0% of patients had IOP greater than 30 mmHg in left eyes (Table 8). Severity of optic disc changes is seen more in patients with PEX glaucoma. In our study 45.6% of patients were having GOA in right eyes compared to OAG without PEX were only 20.8% were having GOA.

Similarly, left eye GOA was present in 61.4% of patients compared to OAG without PEX in whom only 28.1% of patients had GOA (Table 9). Among patients with exfoliative glaucoma majority had exfoliative material at pupillary border (Table 10).

Table (1). Visual Acuity of patients with established glaucoma at presentation.

Visual Acuity		N	%
Right Eye	6/6 - 6/18	35	11.7
	6/18 - 6/36	51	17.0
	6/36 - 6/60	82	27.3
	≤ 6/60	132	44.0
Left Eye	6/6 - 6/18	61	20.3
	6/18 - 6/36	35	11.7
	6/36 - 6/60	36	12.0
	≤ 6/60	168	56.0

Table (2). Fundus picture of established glaucoma cases.

Eye	Fundus	N	%
Right Eye	Normal	71	23.7
	CDR 0.4 – 0.8	149	49.8
	Glaucomatous Optic Atrophy	79	26.4
	Total	299	100.0
Left Eye	Normal	76	25.3
	CDR 0.4 – 0.8	112	37.3
	Glaucomatous Optic Atrophy	112	37.3
	Total	300	100.0

Table (3). Exfoliative Glaucoma in patients with established glaucoma and Side of Involvement .

Pseudo Exfoliative Glaucoma		Left Eye		Right Eye		Bilateral		Total	
		n	%	N	%	N	%	N	%
Overall	Present	47	49.0	31	33.3	37	33.3	115	38.3
	Absent	49	51.0	62	66.7	74	66.7	185	61.7
Right Eye	Present			31	33.3	37	33.3	68	22.7
	Absent	96	100.0	62	66.7	74	66.7	232	77.3
Left Eye	Present	47	49.0			36	32.4	83	27.7
	Absent	49	51.0	93	100.0	75	67.6	217	72.3

Table (4). Age distribution of patients with Exfoliative Glaucoma.

		Patients with PEX Glaucoma		OAG without PEX	
		n	%	n	%
Age (Year)	< 40	1	0.9	5.0	2.7
	40 – 60	30	26.1	70.0	37.8
	≥ 60	84	73.0	110.0	59.5

$P < 0.05$ (Significant)

Table (5). Occupation of Patients with Exfoliative Glaucoma.

Occupation	Patients with PEX Glaucoma		OAG without PEX	
	N	%	n	%
Skilled/Professional	16	13.9	25.0	13.5
Semi skilled	22	19.1	31.0	16.8
Unskilled	77	67.0	129.0	69.7

$P > 0.05$

Table (6). Gender Distribution of Patients with Exfoliative Glaucoma.

Gender	Patients with PEX Glaucoma		OAG without PEX	
	n	%	N	%
Male	92	80.0	144	77.8
Female	23	20.0	41	22.2

P > 0.05**Table (7). Visual acuity of patients with exfoliative glaucoma.**

Visual acuity		Patients with PEX Glaucoma		OAG without PEX	
		N	%	n	%
Right Eye VA	6/6 - 6/18	1	1.5	34	14.7
	6/18 - 6/36	5	7.4	46	19.9
	6/36 - 6/60	14	20.6	68	29.4
	≤ 6/60	48	70.6	83	35.9
Left Eye VA	6/6 - 6/18	3	3.6	58	26.7
	6/18 - 6/36	4	4.8	31	14.3
	6/36 - 6/60	11	13.3	25	11.5
	≤ 6/60	65	78.3	103	47.5

P = 0.000 (Significant)**Table (8). IOP of Patients with Exfoliative Glaucoma.**

Tension (mmHg)			Patients with PEX Glaucoma		OAG without PEX	
			N	%	n	%
Right Eye	Normal	≤ 20	8	11.8	92	39.8
		21 – 30	30	44.1	93	40.3
	Hypertensive	31 – 40	22	32.4	37	16.0
		> 40	8	11.8	9	3.9
Left Eye	Normal	≤ 20	4	44.8	94	43.3
		21 – 30	35	42.2	78	35.9
	Hypertensive	31 – 40	37	44.6	36	16.6
		> 40	7	8.4	9	4.1

P < 0.05 (significant)**Table (9). Distribution of Patients with Exfoliative Glaucoma according to Fundus Examination (Cup Disc Ratio).**

Fundus		Patients with PEX Glaucoma		OAG without PEX	
		N	%	N	%
Right Eye	Normal	1	1.5	70	30.3
	Cupping (CDR 0.4-0.8)	36	52.9	113	48.9
	Glaucomatous Optic Atrophy	31	45.6	48	20.8
Left Eye	Normal	1	1.2	75	34.6
	Cupping (CDR 0.4-0.8)	31	37.3	81	37.3
	Glaucomatous Optic Atrophy	51	61.4	61	28.1

P < 0.05 (Significant)**Table (10). Site of Exfoliation.**

Site of Exfoliation	Patients with PEX Glaucoma		OAG without PEX	
	N	%	n	%
At Pupillary Border	88	76.5	0	0
Anterior Lens Capsule	26	22.6	0	0
Both	1	0.9	0	0

Discussion

This is a Hospital Based Study conducted on 300 patients (600 eyes) with documented glaucomatous changes in fundus raised IOP and open angle of anterior chamber.

The examined patients were recruited from Eye Outpatient Department 300 patients with established glaucoma were studied thoroughly and it was found that 38.3% patients had exfoliative glaucoma. Out of these patients (exfoliative glaucoma) 33.3% had bilateral involvement and 66.7% had unilateral involvement. Majority of the patients (73%) were above the age of 60 years. The condition was more prevalent among males (80%). From the study it was established that the prevalence of exfoliative glaucoma among patients with open angle glaucoma was 38.3% in Kashmir.

The reported prevalence of PEX glaucoma show extensive variation ranging from 0% in Eskimos to greater than 50% in Scandinavian countries. This variation is combination of true differences in race, age and sex distribution of population group examined, the criteria used to define the examined population.

The prevalence found in this part of world is quite similar to that seen in a similar hospital based study conducted by Sziklia P *et al* (1988)⁽⁸⁾ in Hungary. Similarly Moreno-Montanes J *et al* (1990)⁽⁹⁾ in their study in North West of Spain showed almost similar prevalence.

However, in present study the prevalence rate was observed to be lower than that found in Ireland (66%), Finland (47%) and Sweden (75%), but was quiet high as compared to southern parts of this country as shown by studies conducted by Ravi Thomas *et al* (2005)⁽¹⁰⁾ (prevalence of 4.2% in Andhra Pradesh) and H Arvind *et al* (2003)⁽¹¹⁾ (prevalence 13%).

Our prevalence is also high as compared to Pakistan (6.45%) observed by Rashad Qamar Rao *et al* (2006)⁽¹²⁾.

The geographic distribution pattern may be explained by regional gene pool or by environmental influences and it could be also attributed to design of study.

The mean age of patients with PEX glaucoma in this study was 62.16 years with the highest number of patients in the age group above 60 years. This is in agreement with other studies [Aasved H, 1969⁽⁵⁾, Forsius H⁽⁴⁾ 1988, Kontas *et al*, 1993]⁽¹³⁾. This is close to that seen by Cashwell L F *et al* (1988).⁽¹⁴⁾

However, mean age of patients in study conducted by Moreno-Montanes J *et al* (1990)⁽⁹⁾ was 72.4 years and S learner *et al*

(2007)⁽¹⁵⁾ was 72.94 years. Although, the 80% of cases with PEX glaucoma in the present study were males, no definite sex predilection has been previously shown. There are conflicting reports of gender difference in the prevalence of PEX glaucoma.

However some studies have shown increased susceptibility for males to exfoliative glaucoma (Kontas A G, 1993⁽¹³⁾, Sziklai 1988)⁽⁸⁾. Male preponderance of this condition was also seen in Pakistan (Rashad Qamar Rao, 2006)⁽¹²⁾ with male female ratio 1.5: 1

This study revealed that there is a strong association between PEX glaucoma and occupation. The fact that people exposed to outdoor activities as part of their occupation had a significantly higher prevalence of PEX glaucoma with those in whom occupation is restricted to indoor activities provides some support to theory of association between environmental factors (possibly solar radiation) and PEX glaucoma. The majority of our population depends heavily on the agricultural sector for income and would be exposed to outdoor activity in a routine way, may constitute a significant risk factor for occurrence of PEX glaucoma in this population. Similar association was found by Ravi Thomas *et al*⁽¹⁰⁾ while they were conducting study in South India.

Visual acuity of the cases with PEX glaucoma in the study showed that majority of patients had vision of less than 6/60. Similar observation was made by Ravi Thomas *et al* (2005)⁽¹⁰⁾ in their study conducted in Andhra Pradesh.

Our observation is in agreement with Allan P Rotchford *et al* (2003)⁽¹⁶⁾ who observed that there is severe visual loss seen in patients with exfoliative glaucoma. In the study it was found that optic nerve damage occurs very early and severity of nerve damage is greater than that seen in patients with OAG without exfoliation. These observations are quiet similar to that seen by Arvind H *et al* (2003).⁽¹¹⁾

The mean IOP in the study was 28.26 mmHg. This is in accordance with the study conducted by Popovic, Sjostrand (1999)⁽¹⁷⁾ where mean IOP was 28.2mmHg in exfoliation glaucoma cases. In their study they concluded that this is certainly higher when compared with open angle glaucoma without exfoliation. Our mean IOP at presentation is however slightly lower than the study done by Kontas *et al*⁽¹³⁾ where it was 34.2 mmHg.

The patients with PEX glaucoma depicted higher IOP as compared to those with open angle glaucoma without exfoliation. These findings are in agreement with Rotchford AP *et al* (2003).⁽¹⁶⁾

The study showed that exfoliative material was present at papillary border in majority of patients. This observation is contrary to that seen by Ravi Thomas (2005).⁽¹⁰⁾ In their study exfoliative material was seen on anterior lens capsule in 42.9% patients. However, the observations are in agreement with Alan P Rotchford *et al*, 2003⁽¹⁶⁾ who observed maximum patients were having exfoliative at papillary border.

It is evident from the present study that exfoliative glaucoma is highly prevalent in this part of world and needs early detection and appropriate treatment to prevent blindness due to this condition.

Conclusion

The study concluded that prevalence of exfoliative glaucoma as seen in our OPD based cross sectional study was found to be 38.3%. This prevalence was high as compared to prevalence studies conducted in southern parts of the country and low as compared to the studies conducted in the Scandinavian countries.

The difference in the prevalence of the condition was probably in part related to the differences in the climatic conditions, ethnic origin and in part related to genetic factors of the studied population.

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