

Pseudoexfoliation (PEX) Glaucoma Over the Age of 40 Years; a Hospital Based Study

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Purpose: To determine the prevalence of Pseudoexfoliation (PEX) glaucoma in patients over the age of 40 years who presented at eye department of Baqai Medical University hospital, Karachi for examination.

Material and Method: This hospital based prospective case study was carried out at the department of Ophthalmology, Baqai Medical University Hospital, Karachi from August 2000 to January 2004. A total of 3195 patients of 40 years and above were examined on slit-lamp for evidence of PEX syndrome and glaucoma and those found to be having the disease were subjected to further thorough examination including visual acuity, Goldmann applanation tonometry, gonioscopy, slit lamp examination before and after dilatation of the pupil, fundus examination and visual field examination.

Results: Out of 3195 patients 58 (1.81%) were found to be having PEX syndrome, out of which 21 patients showed PEX glaucoma. Out of 3195 patients 1807 (56.55%) males and 1388 (43.44%) were females. Male to female ratio of PEX was 2:1. The prevalence increased with advancing age.

Conclusions: PEX syndrome and glaucoma is more common in males and increases with advancing age.

When an eye with Pseudoexfoliation (PEX) develops glaucoma the condition is referred to as pseudoexfoliative glaucoma, exfoliative glaucoma or capsular glaucoma¹. Glaucoma results from combination of exotrabecular and endotrabecular PEX material, increased aqueous protein and deposition of PEX material on trabecular meshwork and corneal endothelial proliferation². Study showed that eyes with PEX had a 5 fold increased risk of glaucoma. This risk was independent of other known glaucoma risk factors including intraocular pressure (IOP)³. The first description of PEX syndrome reported in Scandinavian literature in 1917, when Lindberg, a Finnish ophthalmologist described the appearance of flakes at the pupillary border of the iris in 30 out of 60 patients having chronic simple open angle glaucoma. He believed the

flakes to be the result of earlier inflammation⁴. In 1925, Swiss ophthalmologist Alfred Vogt established the association of the condition with glaucoma and originated the term "Glaucoma Capsulare" for it⁵. Another Swiss author Malling in 1923 reported the presence of changes in the anterior lens capsule in 40% of his patients with chronic glaucoma and thought that exfoliation and glaucoma were associated⁶. In 1956, Sunde proposed the term "Exfoliation syndrome" to signify multiple tissues involvement as opposed to the previous belief that the anterior lens capsule is involved⁷. Streeten et al studied extra ocular sites for the evidence of PEX material and their study suggests that PEX may be the ocular manifestation of a systemic derangement in the elastic tissue synthesis closely related to elastosis⁸. Now it has been established that in Pseudoexfoliation syndrome there is bluish-white

flaky material deposition at the pupillary border, membrane like deposits on the anterior lens capsule in the center and as granular deposits on the periphery of the lens. In the angle, on zonules and on ciliary processes, it is seen as white gray fluffy masses, while on the corneal endothelium it appears as gray small keratic precipitates (KPs)⁹. PEX material appears to be produced by the equatorial lens capsule, iris pigment epithelium and non-pigmented ciliary epithelium secondary to abnormal basement membrane produced by ageing epithelial cells¹⁰. The disease is of insidious onset with minimal symptoms, so the ophthalmologist should look for early signs when the patient either presents with monocular glaucoma or some other ocular problem¹¹. There is also involvement of the conjunctiva, skin, heart, lung, liver, kidney, cerebral meninges and gall bladder and histological studies show that the material is deposited in these tissues¹². The material has also been demonstrated in the walls of the short posterior ciliary arteries¹³. It is both histochemically and ultra structurally similar to amyloid¹⁰. PEX can cause glaucoma, poor pupillary dilatation, posterior capsular rupture, vitreous loss, phacodonesis¹⁰ and keratopathy¹⁴. As the disease was first described in the Scandinavian countries especially in Norway and Finland, the initial impression was that it was more prevalent in that region than elsewhere¹⁵. However a careful search for the disease in other countries led to accumulation of information from all over the world and the condition is reported from other countries¹⁶. Variations in the prevalence of PEX syndrome have been reported. In one study, Aasved reported incidence of PEX of 4.0% in England, 4.7% in Germany and 6.3% in Norway¹⁷. In Pakistan the prevalence has been reported as 1.2% in persons over 40 years of age and 5.1% in those over 60 years of age¹⁸. There are multiple factors affecting the prevalence of the disease. This is a disease of old age. The usual age prevalence is between 60 and 80 years of age¹⁹. Its prevalence steadily increases after the age of 60 with a mean age in early 70's²⁰. However with decreasing frequency it is also found in the young individuals and the youngest patient reported is at the age of 32 years from Pakistan²¹. It occurs equally in both sexes but is found some years earlier in males than females²⁰. Hereditary factors in the form of autosomal dominant trait or X- linked with poor penetrance are postulated by some authors²². HLA linkage with PEX is identified for 14 antigens. Eleven antigens (HLA A1, A33, B8, B47, B51, B53, B57, B62, DR3, DR12, and DR13) are statistically significantly common in the PEX while three antigens (HLA B12,

B17 and DR2) are significantly less common. This HLA association is evidence for a genetic component to the development of PEX²³. Familial occurrence and hypothesis that PEX syndrome is genetically inherited are reported²⁴.

Clinical classification of the various stages of PEX is based mainly on the findings of the anterior lens capsule².

Suspect

- Early PEX (exfoliative material: precapsular layer)
- Masked PEX (posterior synechiae with other obvious cause)

Definite

- Mini PEX (focal defects in precapsular layer nasally and superiorly)
- Classical PEX (late stage) (Figure I)

Variable data is available regarding raised IOP and glaucoma in PEX syndrome. In one study ocular hypertension was present in 15% of patients having PEX syndrome, while glaucoma was present in 7% of patients having PEX syndrome²⁵. Irvine in a review of literature reported the figures as 14%-90% from different authors⁴. In Pakistani survey 30% patients with PEX syndrome had an IOP more than 20mmHg¹⁸. The subsequent occurrence of raised IOP in patients having PEX syndrome and normal IOP at the initial examination is 5% at 5 years and 15% at 10 years²⁶. If one eye has glaucoma and fellow eye shows PEX, the risk of glaucoma in the fellow eye within 5 years is about 50%²⁶, while some reports put the figures at 7-20% in 5 years and 9-24% in 10 years¹. In those having bilateral PEX syndrome but unilateral glaucoma, 21-26% will develop glaucoma in the other eye in next 5 years¹.

MATERIAL AND METHODS

This prospective analytic study was undertaken at the department of ophthalmology, Baqai Medical University hospital Karachi from August 2000 to January 2004.

Inclusion criteria, all patients 40 years of age and above came in eye O.P.D of Baqai Medical University hospital with various ocular problems. Exclusion criteria, patients below the age of 40 years.

A total of 3195 patients, 40 years of age and above attending the out patient department for various ocular problems were screened for PEX syndrome and PEX glaucoma. The initial examination consisted of slit-lamp biomicroscopy for evidence of PEX material on the edge of pupil or lens in undilated state and in those having suspicion of the disease, the pupils were dilated and repeat slit-lamp examination was performed (Figure 1,2).

Those patients having PEX syndrome were further examined in detail, according to an examination protocol and all the findings were entered in the especially designed proforma for this study. The examination included complete history, general physical and systemic examination and full ocular examination. The ocular examination included visual acuity testing, slit-lamp examination of the anterior segment, transillumination, gonioscopy, applanation tonometry and fundus examination. Visual fields were recorded in those with high IOP and/or cupping of the disc (Figure 2).

RESULTS

Out of 3195 patients examined 1807 (56.55%) were males and 1388 (43.44%) were females. In age group 40-49 years, total 1332 patients were examined, 705 (52.92%) were males and 627 (47.07%) females. In age group 50-59 years, total 922 patients examined, 508 (55.09%) were males and 414 (44.90%) were females. In age group 60-69 years, 552 patients examined, 334 (60.50%) were males and 218 (39.49%) were females. In age group 70 and above, total 389 patients were examined, 260 (66.83%) were males 129 (33.16%) were females (Table 1).

Table I: Total number of male and female patients examined in different age groups.

Age Groups	Males	Females	Total
40-49 years	705	627	1332
50-59 years	508	414	922
60-69 years	334	218	552
70 & above	260	129	389
Total Patients	1807	1338	3195

A total number of 6390 eyes of 3195 patients were examined for Pseudoexfoliation (PEX) syndrome and

glaucoma. Those having PEX syndrome were 58 (1.81%) out of which 21 patients had PEX glaucoma (0.65%).

Out of 58 patients with PEX syndrome 41 (70.68%) were males and 17 (29.31%) were females. Those having PEX glaucoma were 21 out of which 14 (66.66%) were males and 7 (33.33%) were females (Graph I & Table 2).

In age group 40-49 years, total 1332 patients were examined and 5 cases (0.37%) of PEX syndrome and 1 case (0.07%) of PEX glaucoma were detected.

In age group 50-59 years, total 922 patients were examined and 7 cases (0.75%) of PEX syndrome and 2 cases (0.21%) of PEX glaucoma were detected.

In age group 60-69 years, total 552 patients were examined and 17 cases (3.07%) of PEX syndrome and 6 cases (1.08%) of PEX glaucoma were detected.

In age group 70 and above, total 389 patients were examined and 29 cases (7.45%) of PEX syndrome and 12 cases (3.08%) of PEX glaucoma were detected (Graph II & Table 3).

DISCUSSION

Earlier prevalence studies are biased due to the detection of the condition in the Scandanavian countries and most of the earlier authors believed that the condition is more prevalent in the Scandanavian countries²⁷. However one study of 2058 patients over age 60 examined by a single investigator in three countries, Aasved reported similar prevalences PEX of 4.0% in England, 4.7% in Germany and 6.3% in Norway¹⁷. Although wide variation in the prevalence of PEX syndrome and glaucoma have been reported, these variation may be due to differences in the definition of disease, population studied, age and sex distribution and examination techniques¹. Studies from this subcontinent are those of Irvine 8% at Madras, India⁴, 9% cases from Simla India²⁸ are available. In Pakistan the prevalence has been reported as 1.2% in persons over 40 years of age and 5.1% in those over 60 years of age¹⁸. Our figure of PEX syndrome and PEX glaucoma are 1.8% and 0.65% respectively in general population of 40 years and above are comparable to the other study in this part of the world of 1.2% in patients over 40 years of age. The increased prevalence in our study may be due to the higher number of elderly patients examined rather than true difference. In this study prevalence of 3.07% in persons 60-69 years age group and 7.45% in persons

70 years and above group is comparable to that of Aasvad's study¹⁷ and study from Pakistan²⁹. As the disease usually affects the elderly and a steady increase in prevalence occurs with advancing age²⁰. Our data also supports this observation. The disease is thought to occur in an earlier age group in some communities, the youngest in our study is a 42 years old male having unilateral PEX syndrome. While from Pakistan a lady of 32 years of age is reported as the youngest²¹. Male or female preponderance is not yet settled, some studies have shown that PEX is more common among men, several American and European series have indicated that PEX is more common in women¹. For Pakistan a previous study reported a male preponderance with a ratio of male to female of 3:1¹⁸. Our study also substantiates the previous results and shows male preponderance with a ratio of male to female of 2:1. Laterality of the condition is also not settled and various reports speak of different figures 57% unilateral cases in one study, while figures from Pakistan are 20% unilateral in one¹⁸ and 25% in

another study²¹. In our study the prevalence is unilateral in 34.37% of the patients. Variable data is available regarding glaucoma in PEX syndrome. Irvine in review of literature reported the figures as 14%-90% from different authors⁴. In Pakistani survey 30% patients with PEX syndrome had an IOP more than 20mmHg. Our study shows 36.2% association of glaucoma with PEX syndrome which is higher than data available. It may be due to late age of presentation of PEX syndrome. The fact that diagnosis of the condition depends on thoroughness of examination because the disease is asymptomatic. This may be the cause of differences in the prevalence reported by different authors.

CONCLUSION

Pseudoexfoliation glaucoma more commonly occurs in males and its prevalence depends on age and it increases with the age of patients.

Table 2: Prevalence of Pseudoexfoliation glaucoma and syndrome in different gender.

Gender	Examined		Pseudoexfoliation Syndrome			Pseudoexfoliation Glaucoma		
	No. of Eyes	No. of Eyes	No. of Patients	No. of Eyes	Prevalence (%)	No. of patients	No. of eyes	Prevalence (%)
Male	1807	3614	41	82	2.26	14	28	0.77
Female	1338	2776	17	34	1.27	7	14	0.52
Total	3195	6390	58	116	1.81	21	42	0.65

Table 3: Prevalence of Pseudoexfoliation glaucoma and syndrome in different age group.

Age groups	Examined		Pseudoexfoliation Syndrome			Pseudoexfoliation Glaucoma		
	No. of Patients	No. of eyes	No. of Patients	No. of eyes	Prevalence (%)	No. of Patients	No. of eyes	Prevalence (%)
40-49 years	1332	2664	5	10	0.37	1	2	0.07
50-59 years	922	1844	7	14	0.75	2	4	0.21
60-69 years	552	1104	17	34	3.07	6	12	1.08
70 &	389	778	29	58	7.45	12	24	3.08

above								
Total	3195	6390	58	116	1.8	21	42	0.65

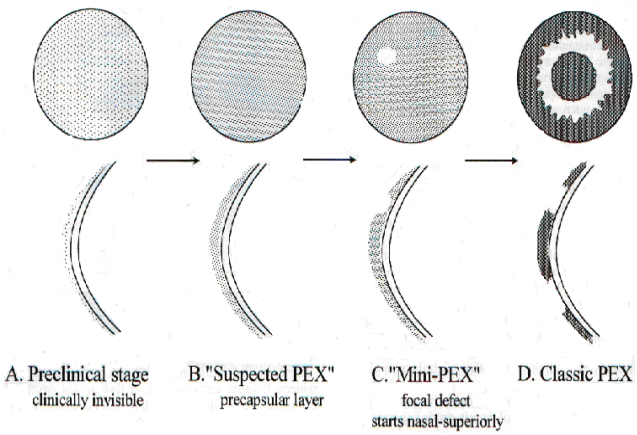
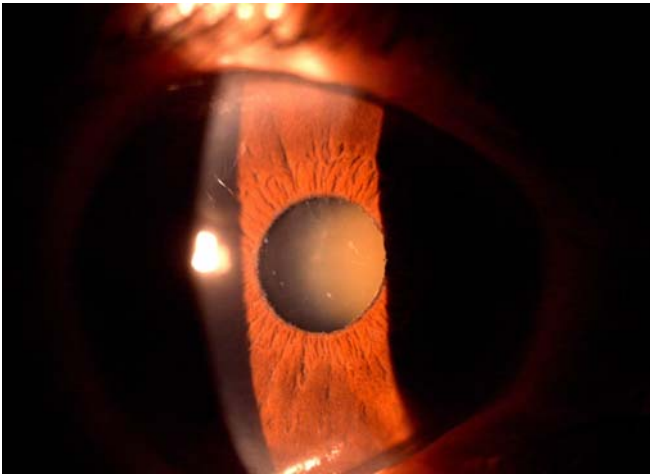
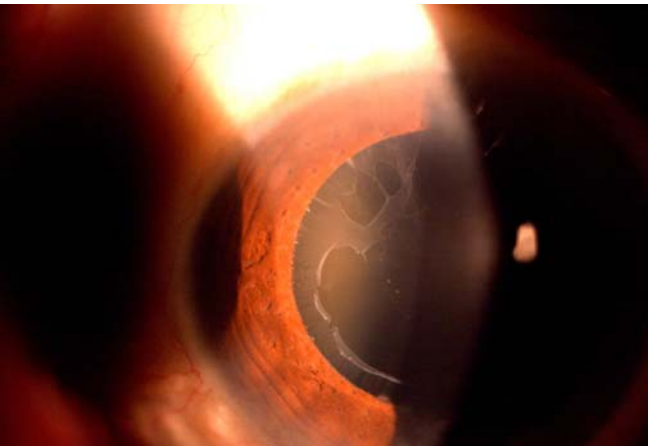


Fig. 1: Schematic representation of clinical classification of PEX syndrome.



Photograph showing granular like deposition of PEX material at pupillary border.



Photograph showing membrane like deposition of PEX material on lens capsule.

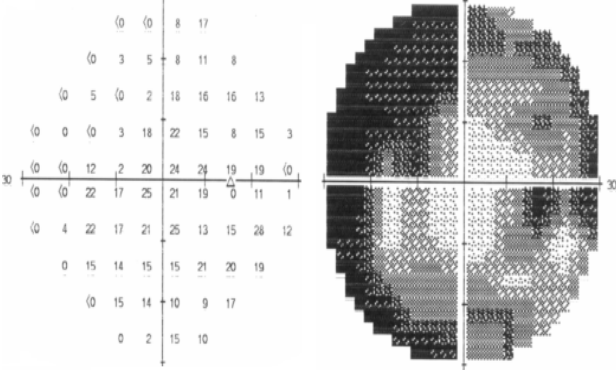
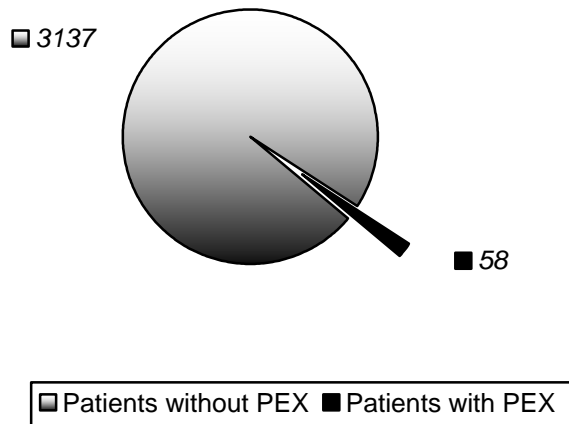


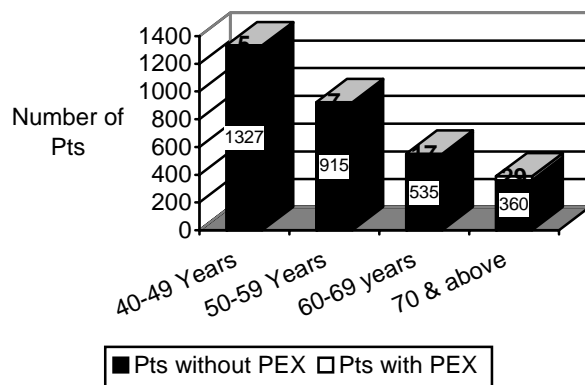
Fig. 2: Showing visual field defect in a patient with PEX glaucoma.

TOTAL NUMBER OF PATIENTS



Graph 1: Showing total number of patients with and without Pseudoexfoliation (PEX) syndrome.

AGE DISTRIBUTION OF PEX



Graph 2: Showing pseudoexfoliation glaucoma in different age group.

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