

Ocular Biometry, Keratometry Reading and Intra Ocular Pressure in age-related cataract patients with and without pseudoexfoliation Syndrome

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ABSTRACT

Objective: This study aims at making a comparison between Ocular Biometry, Keratometry Reading and Intra Ocular Pressure in age-related cataract patients with and without Pseudo Exfoliation Syndrome.

Methodology: A clinical-based cross-sectional study was carried out on 118 patients in 2008, with and without pseudoexfoliation syndrome who were candidates for age-related cataract surgery. Ocular Biometry, the related components including Anterior Chamber Depth, Lens Thickness, Vitreous Chamber Depth and Axial Length were measured using an A-scan ultrasound device. Corneal Power and Intra Ocular Pressure were also measured using keratometer and applanation tonometry, respectively.

Results: Of the 118 patient with mean age 68.97 ± 11.02 years old, 49% were men. Mean age was 71.08 ± 11.19 and 66.91 ± 10.54 years for male and female respectively. 36.4% of total patients had PXS and among them 21.2% of male and 15.3% of the females had Pseudoexfoliation Syndrome. In Ocular Biometry components, the mean of Anterior Chamber Depth was shallower in the patients with Pseudoexfoliation Syndrome than those without it ($P=0.049$). Also mean Intra Ocular Lens power was greater in patients with Pseudoexfoliation Syndrome than those without it ($p=0.046$).

Conclusion: It seems that patients with age related-cataract along with Pseudoexfoliation Syndrome need larger Intra Ocular Lens power and have shallower Anterior Chamber Depth.

KEY WORDS: Ocular Biometry; Intra Ocular Pressure; Intra Ocular Lens; Cataract; Pseudoexfoliation Syndrome.

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INTRODUCTION

The cataract is severe lens opacity or clouding of crystalline lens which brings about vision disorders. In its early stages, the disorder is termed lens opacity and the more severe vision-reducing stages are named cataract. Age-related cataract is predominantly a disease of middle and older age and it is the main and major cause of low vision and blindness in all countries of the world.¹

Pseudoexfoliation syndrome (PXS) is a generalized disorder of the extracellular matrix and characterised by the production of abnormal basement membrane-like or protein-like material in several intraocular tissues including anterior lens capsule and extraocular tissues.^{2,3}

Numerous studies were previously conducted on the relationship between stature^{4,6}, refractive error⁷⁻¹⁰ birth size¹¹, education and socioeconomic conditions¹², age-related cataract (lens opacity)^{13,14} and axial ocular dimensions. However, more knowledge is needed about some related factors such as, ocular biometry, keratometry reading (KR) and intra ocular lens (IOL) measurements in patient with pseudoexfoliation syndrome (PXS).

Therefore, the aim of this study was to compare between Ocular Biometry data, Keratometry Reading (KR) and Intra Ocular Pressure (IOP) measurement in age related cataract patients with and Without PXS.

METHODOLOGY

Study Participants: A clinical-based cross-sectional study was carried out on 118 patients, aged 32 to 99 years old with and without pseudo exfoliation syndrome who were candidates for cataract surgery. The study was completed over a period of five months, from April to September, 2008. For the purpose of validity and reliability of the ocular findings, all the patients were examined by one single ophthalmologist in an eye clinic.

Visual Acuity test: First of all eye examinations such as distance Visual Acuity (VA) was done. Based on the VA (numeric notation measurements), the patients were classified into five groups: Light Perception (LP), Hand Motion (HM), Counting Finger (CF), $1/10 < VA < 3/10$, and $VA > 3/10$.

Age-related cataract diagnostic: A slit lamp was used to grading the cataracts as clinically into five subgroups, including Nuclear Sclerosis (NS), Posterior Sub Capsular (PSC), Cortical Cataract (CC), Mixed Cataract (Mix C) and Mature Cataract (Mat C).

Pseudoexfoliation Syndrome diagnostic: The criterion for diagnosing PXS was the presence of pseudoexfoliation material in any of the anterior segment structures that can easily be detected by slit lamp examination.

Table-I: Distribution of cataract.

Cataract	n(%)
posterior sub capsular cataract	15(12.7)
nuclear sclerosis	12(10.2)
cortical cataract	3(2.5)
mixed cataract	65(55.1)
mature cataract	23(19.5)
Total	118(100)

Keratometry Reading: Using Keratometer, HAAG-STREIT instrument (Jawal modle), KR was done by measuring the corneal curvature radius at two meridians, each 90° apart. Also corneal astigmatism calculated as difference between both Keratometry principals' meridians.

Assessment of Ocular Biometry: Ocular dimensions including anterior chamber depth (ACD), lens thickness (LT), vitreous chamber depth (VCD), axial length (AL) and Intra ocular lens (IOL) were measured with an A-mode contact ultrasound (10-MHz Nidek) device. Also SRK-T formula was used for IOL power calculation.

IOP measurements: The IOP of both eyes were recorded using Goldmann applanation tonometry (HAAG-STREIT, Swiss). Finally, funduscopy was performed with +78 D lens, when feasible.

Statistical Analysis: Continuous variables were expressed as mean \pm standard deviation (SD). Chi-square test was used to assess the difference proportion of men and women with and without PXS. We used independent t-test to compare means of Keratometry at principle meridian one (K1), Keratometry at principle meridian two (K2), ACD, VCD, LT, AL, IOP and IOL in these patients. To compare Age, K1, K2, ACD, and AL in three categories of astigmatism one way analysis of variance was used. All statistical analyses were performed using SPSS version 11.5. A P-value < 0.05 was considered to be statistically significant.

RESULTS

Data were available on 118 patients with phakic eyes with and without pseudo exfoliation syndrome who volunteered for age-related cataract surgery. PXS was found in 36.4% (43) of the eyes with 18.6% (22) cases affecting the right eye and 17.8% (21) cases in the left eye. In terms of sex, 21.2% (25) of the males and 15.3% (18) of the females had PXS. Chi square test revealed that the differences between sexes for PXS are not statically significant. The average age of 58(49%) males was calculated as 71.08 ± 11.19 years.

Table-II: Distribution of visual acuity.

Visual acuity (VA)	n(%)
Light perception	21(17.8)
Hand motion	5 (4.2)
Counting finger	78 (66.1)
$1/10 < VA < 3/10$	13 (11)
$VA > 3/10$	1(0.8)
Total	118(100)

Table-III: Ocular biometry, KR, IOP and IOL measurements in terms of PXS.

	PXS	Mean±SD	p-value
Keratometry at principle meridian one (D)	Yes	44.96±1.61	0.053
	No	44.43±1.30	
Keratometry at principle meridian tow (D)	Yes	44.22±2.01	0.457
	No	44.45±1.32	
Mean of keratometry at principle meridian one and tow (D)	Yes	44.58±1.68	0.505
	No	44.41±1.15	
Anterior chamber depth (mm)	Yes	2.65±0.32	0.049
	No	2.79±0.39	
Length thickness (mm)	Yes	4.08±0.46	0.658
	No	4.12±0.52	
Vitreous Chamber Depth (mm)	Yes	15.97±0.90	0.306
	No	16.20±1.26	
Axial length (mm)	Yes	22.70±0.88	0.071
	No	23.11±0.90	
Intra ocular pressure (mmHg)	Yes	12.35±2.38	0.678
	No	12.18±1.96	
Intra ocular lens (D)	Yes	21.74±2.12	0.046
	No	20.44±3.89	

As for 60 (51%) female subjects, the average age was 66.91 ± 10.54 years. Independent sample t-test revealed that there was a statistically significant difference in age between males and females ($p=0.039$). Forty nine percent of the examined eyes were right and the other fifty one percent were left eyes. Independent sample t-test revealed that there was no statistically significant difference between right and left eyes for ocular biometry parameters, IOP and IOL power ($P>0.05$).

The distribution of VA and cataract subgroups is shown in Table-I and Table-II. The mean of Ocular biometry, KR, IOP and IOL measurements, in terms of PXS is summarized in Table-III. The means of age and IOL power were greater in the patients with cataract with PXS than those without PXS (p -value < 0.001 and < 0.046 , respectively). Also, the mean of ACD was shallower in the patients with PXS than the other patients ($p=0.049$).

The results of one way ANOVA test as well as the mean of age, K1, K2, ACD, and AL measurements in relation to corneal astigmatism is shown in Table-IV. However, the mean of K1, K2 and Mean K

were significantly more in the females than those in the males.

DISCUSSION

As the results of this study showed, based on clinical grading of cataract by anatomical location mixed cataract and mature cataract were the most common forms respectively and for the distribution of VA, the vision of counting finger with 66.1% of cases and light perception with 17.8% cases were the most common conditions. These findings are the indications of the patients' late approaching for cataract surgery in the area of Sabzevar, Iran. It may be due to their occupation since most of them, whether males or females, worked on the field or were male workers and female housekeepers. On the other hand these findings may confirm the need for a gross VA in these patients. Besides, the good vision of the fellow eye may have caused their late approaching for the cataract surgery procedure.

As for investigating the PXS, the results of this study showed that 36.4% of eyes had PXS and there were statically significant difference between

Table-IV: Mean distribution of Age, ocular biometry and corneal keratometry in terms of astigmatism.

	Age (year)	Keratometry at principle meridian one (D)	Keratometry at principle meridian tow (D)	Anterior depth (mm)	Axial chamber length (mm)
No astigmatism	72.87± 8.99	44.29± 1.30	44.29± 1.30	2.62±0.30	22.83± 0.79
Against the rule	70.88± 9.80	45.2 1±1.37	43.86±1.78	2.68±0.39	22.74±0.81
With the rule	62.83±11.91	44.11 ±1.39	45.15±1.29	2.91±0.36	23.39±1.71
P-value	<0.001	<0.001	0.001	0.003	0.031

patients with and without PXS for mean of age and IOL power. Also, the mean of ACD was shallower in age-related cataract patients with PXS than the other patients ($p=0.049$). This result is similar to the finding in the literature.^{3,15,16} However, explanations for this finding may be due to zonular weakness, type of cataract, anterior displacement of lens iris diaphragm and increased age.

But, present study did not show statically significant difference for mean of K1, K2, mean K, LT, VCD, AL and IOP between both groups with and without PXS. Study by Altintas¹⁷ for comparison of the IOP in 19 patients with PXS and 25-age matched and normal subjects showed that the mean IOP of PXS patients was significantly higher than the control group. This difference may be due to difference in age of subjects, sample size, ethnicity of the study population and other affecting factors. In present study investigation of ocular biometry was done in age related cataract patients with and without PXS. Furthermore, in this study corneal astigmatism was found in 72.9% of the patients and also the present study revealed that young age is a risk factor for corneal astigmatism and "against the rule" astigmatism is more likely to occur in older ages. In terms of gender, the mean of corneal power for K1, K2 and mean K were significantly more in females than those in males. Similarly, a study by Shufelt et al¹⁴ on adult Latinos population revealed that corneal power is greater in females.

In conclusion, it seems that patients with age related-cataract along with PXS have shallower ACD, hence need greater IOL power and are older. Also, younger age in patients with age-related cataract can be considered as a risk factor for corneal astigmatism and "against the rule" astigmatism is more common in older ages.

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