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Original Research Article

Evaluation the effect of posterior sub-capsular cataract on the refractive state of eye

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ABSTRACT

Background: Cataract refractive errors are caused by cataracts. It can go up to several dioptres (D). Correction of expected refractive errors during cataract surgery by altering the axial length measurement. Determine the effect of posterior sub-capsular cataracts on the eye's refractive status.
Methods: 112 patients with posterior sub-capsular cataracts participated in the study. The most common refractive error found in PSC was astigmatism, followed by myopia. The study was conducted at Angel Eye Institute of Ophthalmology; Kanpur U.P. The refractive status of eyes with posterior sub-capsular cataracts was determined using retinoscopy and subjective refraction. Biometry is done by A-scan and keratometer.
Results: A total of 112 patients were included in this study. Of these, 27 (26.5%) were males and 75 (73.5%) were females. The Patient's age was about 60 years. The results showed that the refractive errors caused by posterior sub-capsular cataracts were mainly myopic astigmatism (97. 1%) and spherical myopia (2.9%), 0.16SD. The mean value of myopic astigmatism in patients with PSC was (1.7D, 15.7%), 0.93 SD and the mean value of spherical myopia was (0.1 D, 2.9%), 0.67 SD. Mean uncorrected visual acuity was 1 log MAR and 1.6 SD. The mean corrected visual acuity was 0.3 log MAR and 1.2 SD.
Conclusions: The most significant refractive error in PSC was astigmatism, followed by myopia. These findings may help clarify the type of refractive error in patients with PSC and the prediction of ocular vision outcome.

Keywords: Astigmatism, Posterior sub-capsular cataract, Spherical myopia

INTRODUCTION

The objective of the study was to determine the effect of posterior sub-capsular cataracts on the eye's refractive status. It is clear that some people with nuclear cataracts will convert to myopia as a result of this condition.[1-3] The myopic shift allows normal reading skills without the need for spectacles, but distance vision decrease. It is not entirely clear how cataracts, both cortical and posterior capsular (PSC), affect a patient's refractive error. Planter claimed that cortical opacity caused large hyperopic changes, but no one was able to confirm or refute this finding.[4,5] There is evidence in the form of review articles that changes in astigmatism may be caused by cortical opacities. [6,7] On the other hand, these reports are based solely on clinical perception without any factual support. In previous experimental studies, researchers have looked for evidence that age-related cataracts lead to changes in refractive error astigmatism, but found nothing.[9,10] Nevertheless, it is important to revisit this topic because newly developed techniques, such as vector analysis of astigmatism and improved cataract grading systems,

should improve sensitivity to identify these changes if they occur exist.

METHODS

This hospital-based cross-sectional study aimed to determine the effect of posterior sub-capsular cataracts on the eye's refractive status at the outpatient department of Angel Eye Institute of Ophthalmology; Kanpur U.P. Institutional ethical committee clearance was obtained prior to the onset of the study. The study duration was from October 2018 - March 2019. The main objective was to identify the types of refractive error commonly seen in patients with posterior sub-capsular cataracts. A cataract is defined as less than 6/36 vision in the better eye caused by an opacity of the lens called a cataract or a cataract is a dense opacity of the lens that may account for less than 6/36[11]. Blurred vision, clouding under the posterior capsule, is considered a cataract, so vision can be severely impaired even in the early stages.[12] Refractive errors, also called refraction errors, are problems with focusing light on the retina due to the shape of the eye with posterior sub-capsular cataracts.[13]

The inclusion criteria were all patients with posterior sub-capsular cataracts.

Exclusion criteria included mental retardation, patients without consent, history of intraocular surgery, eye trauma, corneal scarring or opacity, and patients with the following conditions that may affect the refractive status of the eye: keratoconus, trauma, orbital mass, Pterygium and eyelid mass such as chalazion. After obtaining ethical committee clearance a total of 112 patients were selected through serial sampling Informed consent was obtained from each patient, and the goals and objectives and characteristics of the protocol were described. The examination team included two Ophthalmologists, two Optometrists and other supporting staff. Only Old patients present on the day of examination were screened. The Patient's age was about 60 years. After recording age and sex, height and weight were measured first. The patient's VA was recorded using a Snellen chart at standard distances for male and female Eye OPD at Angel Eye Institute of Ophthalmology; Kanpur U.P. Slit lamp bio-microscopic examination for the diagnosis of PSCs was done by an ophthalmologist present on duty.

Any patient showing signs of PSC was referred to refraction. Determine the patient's refractive status using objective and subjective refractive techniques. Objectively, the refractive state was obtained using an automated refractometer and a retinoscopy. A subjective refractive status check was performed after refraction, and VA was re-recorded after full refractive correction. After complete refraction in the refraction chamber, axial length and corneal curvature were measured in Eye OPD. Vector analysis was used to determine lens astigmatism, which was obtained by subtracting corneal astigmatism from total astigmatism. Data were imported into SPSS version 16 and analysed in tables and graphs.[14,15]

RESULTS

A total of 112 PSC patients were included in the study. Among 112 patients, 27 (26. 5%) were male and 75 (73.5%) were female. The mean age of patients with PSC was 60.5 years, with a standard deviation of 5.8. large quantity. Those in their 50s and 60s accounted for 41.2%. As a result of the study, the refractive error caused by CSP was mainly myopia (97. 1%) and spherical myopia (2. 9%), with an SD of 0.16. The mean values of myopic astigmatism in CSP patients were (1.7 D, 15.7%) and 0. 93 SD and the mean values of spherical myopia were (0.1 D, 2.9%) and 0.67 SD. The average unaided visual acuity was 1 log MAR and 1.6 SD. The mean corrected visual acuity was 0.5 log MAR, 1.2 SD.

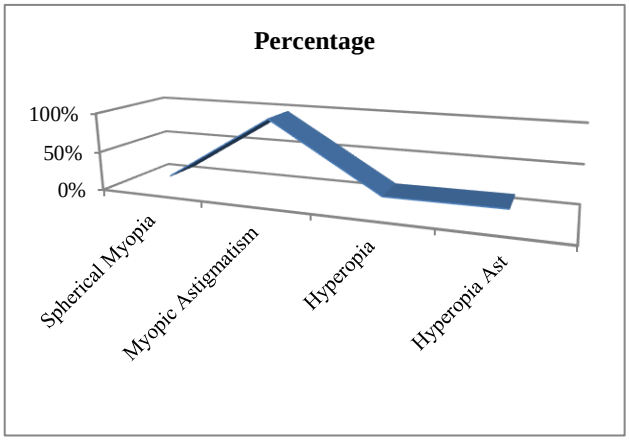

Figure 1: Types of refractive error in percentage.

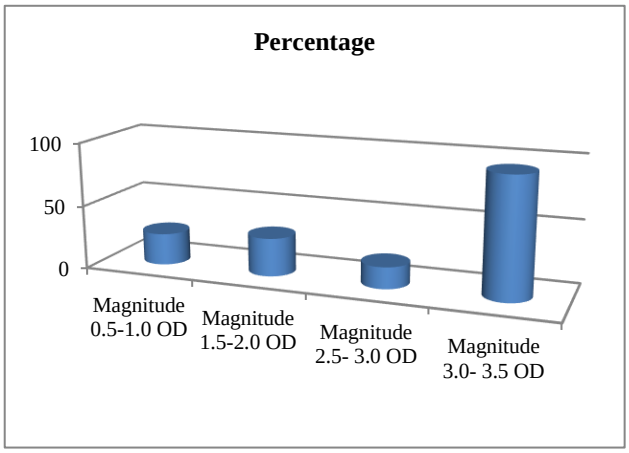

Figure 2: Magnitude of myopic astigmatism in percentage.

The myopic astigmatism range is 0.5D to 4D. No. There were 31 patients in the range of 0.5-1.00D, a percentage of 30.4, 43 of them in the range of 1.00-2.00D, representing 42.2%, and 17 patients in the range of 2.00D - 3. 00D, accounting for 16.7%, the range is 3.00D-

4.00D, 65.9%. It turns out that max no Patients with myopic astigmatism in the range 1.00D to 2.00D.

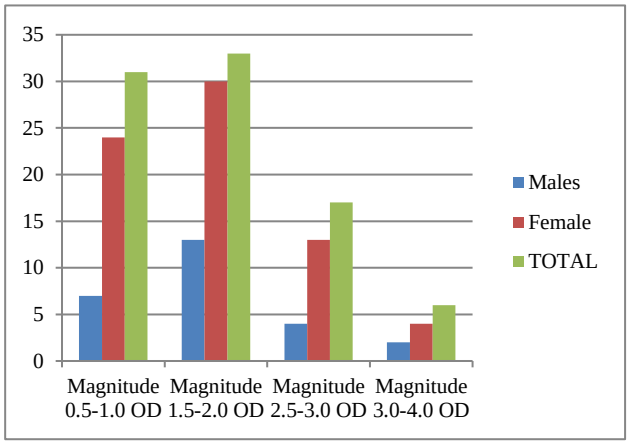

Figure 3 (A): Gender wise magnitude of myopic astigmatism patients.

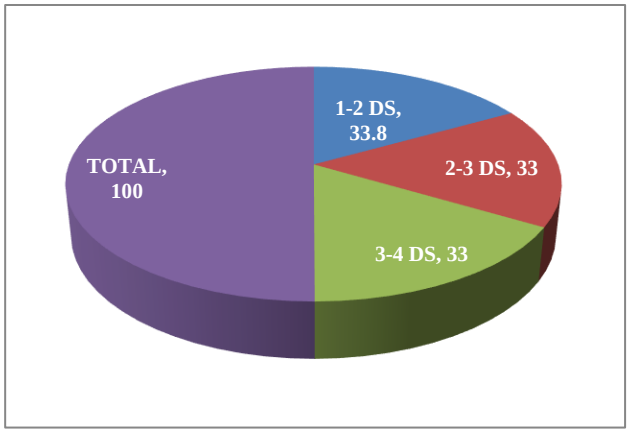

Figure 3 (B): Magnitude of spherical myopia in percentage.

Table 1: Gender-wise distribution of patient with unaided visual acuity unaided visual acuity.

Log MAR	No. of patients
0.3logMAR	1 male
0.5logMAR	8 (2male and 6 female)
0.6logMAR	9 (2male and 7 female)
0.8logMAR	17 (5 male and 12 female)
1logMAR	16 (3 male and 13 female)
1.3ogMAR	20 (4 male and 16female)
<1.3logMAR	31 (10 male and 21 female)

Meanwhile, the magnitude of Myopic Astigmatism in male and female patients affected with PSCs is shown in Figure 3 with the range of 0.5D-4.00D. In the range of 0.5D-1.00D, 7males and 24 females are present. 13 males and 30 females are present in the range from 1.00D-2.00D. In the range 2.00D-3.00D, 4 males and 13 females are present and 2 males and 4 females are present in the range from 3.00D-4.00D.

The range of Spherical Myopia is 1.00DS-4.00DS. The no. of the patient in the range 1.00DS-2.00DS is 1 (male patient) with 33%, in 2.00DS-3. 00DS 1 female patient is present with 33% and in 3.00D -4.00 DS, no. of a patient is also 1 (female) with 33%.

Table 2: Gender-wise distribution of patients with correlated visual acuity corrected visual acuity.

Log MAR	No. of patients
0.1log MAR	8 (2 males and 6 females)
0.2log MAR	18 (5 males and 13 females)
0.3log MAR	26 (5 males and 21 females)
0.5log MAR	41 (11 males and 30 females)
0.6log MAR	2 (2 males)
0.8log MAR	7 (2 males and 5 females)

Table 1 has shown the visual acuity which is presented in log MAR with the gender-wise distribution. A male patient has visual acuity of 0.3logMAR, which is 1%, 8 patients have 0.5logMAR, which is 7.8%, 9 patients have 0.6logMAR, which is 8.8%, 17 patients have 0.8logMAR, which is 16.7%, 16 patients have 1logMAR, which is 15.7%, 20 patients have 1.3logMAR, which is 19.6%, and 31 patients have visual acuity of less than 1.3logMAR, which is 30.4%. The highest patient's visual acuity is below 1.3 logs MAR.

Out of 102 patients, 8 have corrected visual acuity of 0.1logMAR or 7.8%, 18 have corrected visual acuity of 0.2logMAR or 17.6%, 26 have corrected visual acuity of 0.3 log MAR or 25.5%, 41 have corrected visual acuity of 0.5logMAR or 40.2%, 2 have corrected visual acuity of 0.6logMAR or 2%, and 7 have corrected visual acuity of 0.8logMAR or 6.9%. 0.5logMAR is the maximum corrected visual acuity.

DISCUSSION

Posterior subcapsular cataracts have a refractive error with myopic astigmatism (97.1%) and spherical myopia (2.9%), with a standard deviation of 0.16. The mean values of myopic astigmatism in PSC patients were (1.7 D, 15.7%) and 0.93 SD and the mean values of spherical myopia were (0.1 D, 2.9%) and 0.67 SD. The average unaided visual acuity was 1 logMAR and 1.6 SD. The mean corrected visual acuity was 0.3 log MAR and 1.2 SD. This can be caused by symmetrical refractive index changes in the lens core, resulting in spherical aberration and myopic shift.[16,17]

As reported in other studies.[18-20,21-25] nuclear cataract causes a significant myopic shift, probably on account of symmetrical refractive index changes within the nucleus of the lens, causing negative spherical aberration and a myopic shift.

This study showed that female patients were more likely to develop PSC than males, with the frequency being 75

cases (73.5%) in female patients versus 27 cases (26.5%) in female patients. This suggests that female patients are more likely to be affected than males. In a study of the incidence of PSC in hereditary retinal degeneration, the overall incidence of posterior subcapsular cataracts was 41%. The Beaver Dam Eye Study and a population-based study of age-related cataract prevalence and risk factors in Taiwan also found that women were at higher risk of PSC. The age of the 15-year-old group ranges from 50 to 75 years. 43 (41.2%) were aged 50-60, 31 (30.4%) were aged 60-65, and 29 (28.4%) were aged 65-75. The above study also shows the max. The Patient's age was about 60 years old. A study of the eyes of beaver dams indicated that the peak age affecting PSC was greater than 50 years.[11]

Studies have shown that the type of refractive error found in patients with PSC was primarily astigmatism, followed by myopia. The incidence of PSC patients with myopic astigmatism was 99 cases (97.1%), and the incidence of spherical astigmatism in PSC patients was 3 cases (2.9%). According to the British Journal of Ophthalmology, there is significant variation in astigmatism (14%) in patients with PSC cataracts.

CONCLUSION

The following studies show the importance of the different types of refractive errors encountered in patients with PSC. The most significant refractive error found in patients with PSC was astigmatism, followed by myopia. Women are more affected than men. Wearing glasses can improve vision to some extent. These findings may help clarify the type of refractive error in patients with PSC and the prediction of spectacle vision outcome.

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