

Quality of Life Assessment in Monocular Glaucoma Patients with Indian Vision Function Questionnaire

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Abstract

Background: Glaucoma impacts individuals at various levels, this study is to assess the quality of life in monocular patients with glaucoma in Indian population.

Purpose: To evaluate the components affecting the quality of life, in monocular glaucoma patients using Indian vision function questionnaire.

Design: Prospective cross-sectional study

Methods: The study was conducted from July 2016 to February 2017. 220 patients were included and divided into two groups as cases and controls. Indian Vision Function Questionnaire (IND-VFQ) was administered. Data of 196 (89.1%) patients were finally analysed. 129 (58.6%) patients who have lost their vision in one eye due to glaucoma were included as cases and 67 (30.4%) of patients who had lost their vision due to other causes were taken as controls.

Result: Median Composite score of subscales was 54.62(29.7 – 74.7) in group 1 and 45.38(23.7 – 76.7) in group 2. Psychosocial impact scale was the most affected scale, the median score was 33.02 (0 to 60.0) and 19.07 (0 to 53.0) in group 1 & 2 respectively. Among all

dimensions of IND VFQ, the highest score was for colour vision 100.0 (0 – 100.0) and 100.0 (0 – 100.0), and lowest median score was found in mental health and dependency in both the groups. Multiple linear regression analysis demonstrated that visual acuity was associated with low score (p <0.001). Female gender was significantly associated with overall score in univariate model (p =0.006)

Conclusion: Monocular glaucoma patients have a poor general and vision related quality of life. Depression associated with monocularity and the perception of dependency and being a burden on their family members greatly impacted the mental health of the participants.

Keywords: Quality of life, Monocular, Primary open angle glaucoma, Primary angle closure glaucoma.

Introduction

The term ‘quality of life’ (QoL) is a broad concept incorporating the patient’s perspective of health, it also reflects the gap between a person’s expectations and their present status.^[1] QoL was introduced to ophthalmology in the 1980s as an evaluation. Compared with the general QoL evaluation tools, vision-related QoL measurements

have been widely accepted as it specifically reflects the impact of visual function impairment on the individual.^[2] Maximising a patient's QoL has been one of the main goals of glaucoma treatment, since vision-related QoL is reduced by glaucoma.^[3-5] In 1996, Zimmerman et al challenged the current guidelines for the treatment of glaucoma focusing attention away from clinical indicators to quality of life.^[6] Outcome assessment has become increasingly important as a critical measure for treatment and management of medical conditions, and Zimmerman et al and Lee et al have highlighted the need for patient-centred care in glaucoma.^[6-8]

A myriad of patient-reported outcomes (PROs, commonly referred to as questionnaires or instruments) have been developed in the field of ophthalmology over the past 20 to 30 years.^[9] The National Eye Institute Visual Functioning Questionnaire (NEI-VFQ) developed by Mangione et al is among the most popular questionnaires.^[10] It has been developed predominantly for a Western population and so the content may be perceived as irrelevant by those in developing countries, such as India. In contrast, the Indian Vision Function Questionnaire (IND-VFQ) was specifically developed for the Indian population.^[11] During development of IND-VFQ, recruited patients were of cataract, glaucoma and retinal conditions (Diabetic retinopathy and age related macular degeneration) in methodology, so it is validated for our patient population.^[12] Some previous studies have indicated that conventional clinical measures such as visual acuity (VA) and visual field assessments failed to fully capture the picture of visual disability on daily visual functioning and on abilities to perform activities of daily living that are valued by patients. So, questionnaires will be helpful to evaluate the visual and general health disabilities better.^[13]

Glaucoma impacts individuals at various levels, it reduces ability to carry out self-care activities, dependence, depression, falls, traffic accidents, increased risk of fracture, and increased mortality.^[13 - 21] Few studies have evaluated the functional impact and recovery from acquired monocular vision and sampled a more diverse population of monocular patients and employed a custom made rather than validated questionnaires to evaluate the function and recovery of their patients. Statistical significance was found between normal and those with monocular vision following surgery.^[22-24] Till date and to the best of our knowledge no study in literature has assessed the quality of life in monocular patients with glaucoma in Indian population. Primary purpose of this cross-sectional questionnaire-based study is to assess the QoL in monocular glaucoma patients with IND-VFQ and factors affecting their QoL. The secondary purpose of our study was to compare the differences in vision related quality of life (VRQoL) between monocular glaucoma patients and monocular vision loss due to any a etiology other than glaucoma.

Material and Methods

This was a prospective hospital based cross sectional study, conducted from July 2016 to February 2017. Institutional Ethical Clearance (IEC) was obtained from the Institutional Review Board (IRB) OF Aravind Eye Care, Tirunelveli. The study was conducted in accordance with the tenets of the Declaration of Helsinki for research involving human subjects.

Patients, aged 40 years and above, with primary open angle glaucoma (POAG) and primary angle closure glaucoma (PACG) on long term drug therapy with vision loss in one eye due to glaucoma with best corrected visual acuity (BCVA) in better eye > 0.5 without any significant media opacity were taken as cases for the

study. Monocular patient with vision loss due to reasons other than glaucoma were taken as control. Patients with suspected glaucoma, bilaterally blind patients, patients with primary neurodegenerative diseases and psychologically disturbed patients were excluded from the study.

POAG patients who had been previously diagnosed and met at least two of the following three eligibility criteria were included: IOP consistently greater than 21 mmHg with open angle, visual field changes associated with glaucoma, or optic nerve changes consistent with glaucoma. Angle closure glaucoma included cases with glaucoma in association with a closed angle (iridotrabecular contact noted on gonioscopy in $> 270^\circ$ angle) with or without peripheral anterior synechiae with elevated IOP.

Demographic information (age, sex, educational background) was collected by the principal investigator through face-to-face interviews. Detailed clinical evaluation included slit lamp bio microscopy, intraocular pressure (IOP) measurement using gold Mann applanation tonometry (HAAG-STREIT 900, Haag-Streit, USA) Central corneal thickness using ultrasound pachymeter (Tomey SP-3000, Tomey Ltd, Japan), & gonioscopy using a 4 mirror Sussman gonio lens (Ocular instruments Inc., Bellevue, WA).

Optic disc evaluation with a Volk 90 D lens, and visual field examination conducted using Swedish interactive threshold algorithm (SITA) standard program of Humphrey field analyser (Carl Zeiss Meditec Inc, Dublic, CA) with central 24-2 strategy. The central visual field was analysed with 10-2 SITA standard strategy using size III stimulus. Visual field defects were classified into mild, moderate, and severe visual field loss using mean deviation (MD) indices and a modification of the

Hodapp–Parrish–Anderson classification. Mild visual field loss was defined as a mean deviation of less than or equal to -6 decibels (dB), moderate visual field loss was defined as MD greater than -6 dB but less than -12 dB, and severe visual field defect as MD greater than -12 dB. Visual Acuity was assessed with a log MAR chart and recorded separately for each eye by trained optometrist. Phakic eyes underwent evaluation of crystalline lens with pupillary dilatation using the lens opacity classification system II (LOCS II). All these examinations were within the routine check-up for the glaucoma patient's follow-up visits.

Patients were then divided into two groups. Group 1 (cases) consisted of monocular patients diagnosed with POAG & PACG. Group 2 (controls) consisted of monocular patients who have lost their vision in one eye due to causes other than glaucoma such as trauma, Choroidal Neovascular Membrane (CNVM), vitreous haemorrhage, vein occlusion.

Indian vision function Questionnaire (IND-VFQ) was administered to 220 patients. Reply to questionnaire was filled with the help of expert clinical research associate. For the subjects with writing difficulties, the researchers stated the questions and possible answers in a neutral tone for their independent choice was recorded accurately. Twenty-four incomplete and incorrect data were excluded and 196 complete data were included in the final analysis.

Indian vision function questionnaire

The IND-VFQ (ANNEXURE) [Table 5] is a patient-based measure of vision related quality of life that was developed and field tested in apex eye institutions of India.^[12] Interviewer bias during the administration of the questions were taken care of and translation and back-

translation methods were used by competent bilingual translators to ensure accuracy.

Scaling

The questionnaire was administered to the patients in the hospital on routine visit. It consisted of 33 items and it was divided into 3 scales which were general functioning (Q1 – Q21), psycho-social impact (Q22 – Q26), and visual symptoms (Q27 – Q33).

The general functioning scale consisted of questions regarding the day-to-day problems faced by the patients. Questions regarding the psychological burden of the disease were noted on the psychosocial impact scale. Any symptoms related to vision were recorded on the visual symptom scale.

Responses to general functioning scale was rated on a 5-point Likert-type scale and psychosocial and visual symptoms scales were rated on 4-point Likert scale.

These scales were further divided into 10 subscales-general vision (GV, 3 item); difficulty with near-vision activities (NV, 7 items); difficulty with distant-vision activities (DV, 2 items); limitation of social functioning because of vision (Soc. health, 3 items); mental health problems because of vision (MH, 2 items); role limitations because of vision (LOA, 6 items); dependency on others because of vision (Dep, 1 items); difficulty with colour vision (CV, 1 item); difficulty with peripheral vision (PV, 1 item) and glare disability and dark adaptation (8 items). Each subscale score was converted to a score from 0 to 100. Higher scores indicated better vision-specific QoL. Composite score is the mean score of all subscales, calculated by adding all subscales divided by number of subscales.

Developed as an interviewer administered questionnaire and taking an average of 20–25 minutes to complete, the IND-VFQ is suitable for use in populations of mixed

literacy levels and short enough to keep respondent burden to a minimum.^[12]

Statistical analysis

In demographic data, continuous variables were represented as mean and standard deviation (SD) and categorical variables were represented as frequency (percentage). Chi square test or Fisher's exact tests was used to assess the association in categorical data. Normality of the variables was verified using Shapiro-Wilk test. IND-VFQ scores were presented as median and interquartile (IQR). The mean comparison of ocular parameters between case and control was done by independent t-test for normally distributed data and Mann Whitney U test for skewed data. Linear regression analysis was used to find the factors associated with quality-of-life scores. All the subjects were included into the model. The statistical analysis was performed by STATA 14.0 (College Station, TX, USA). $P < 0.05$ were considered as statistically significant.

Results

A total of 196 patients, 86 (44%) female and 110 (56%) male, with 72 POAG, 57 PACG, and 67 controls, were taken for the final analysis (Figure 1). Demographic data of the patients are shown in table 1. 68.41% of patients were educated. The mean age of participants were 64.7 ± 9.5 years and 62.70 ± 10.4 years in group 1 and 2 respectively. Mean IOP in better eye was 13.94 ± 4.2 and 14.87 ± 3.8 mmHg in group 1 and 2 respectively, which were not statistically significant. Best corrected median log-Mar visual acuity was 0 (0 to 0.18) in group 1 and 0.18 (0 to 0.30) in group 2. The median of mean deviation of HFA in better eye in group 1 was -12.50 db (-20.9 to -7.1) and in group 2 was -8.20 db (-11.1 to -4.1). Statistical significance was seen between the two groups in the mean deviation of visual field of better eye

($p = 0.008$). The median duration from monocular blindness to questionnaire analysis was 84 (36 to 132) months in group 1 and 60 (12 to 96) months in group 2. Family history was present in 5 (3.9%) of group 1 participants and 29 (22.5%) had systemic illness in the form of diabetes, hypertension, asthma or cardiac problems. In group 2, systemic illness was present in 15 (22.4%) participants.

Median score for general functioning scale, psychosocial impact scale and visual symptom scale were 67.80 (41.1 to 80.8), 33.02 (0 to 60.0) and 42.04 (14.0 to 80.7) respectively in group 1 and in group 2, scores were 54.00 (32.0 to 82.0), 19.07 (0 to 53.0) and 42.05 (28.0 to 76.0) respectively (**Table 2**). Psychosocial impact scale was the most affected scale among all other scales. Among all dimensions of IND VFQ, the highest median score was for colour vision 100 (0-100.0) and 100 (0-100.0), followed by near vision 78.57 (53.6-96.4) and 67.85 (42.1-92.8) in group 1 and 2 respectively. Lowest median score was for mental health 0 (0-50.0) and 0 (0-33.3) and dependence 0 (0-100.0) and 0 (0-66) in group 1 and 2 respectively as shown in table 3. Overall median score was 54.62 (29.7-74.7) in group 1 and 45.38 (23.7-76.7) in group 2. Best corrected vision in the better eye was found to be an important factor affecting the quality of life ($p < 0.001$). If visual acuity gets worse in better eye, then the overall score decreases by 40.7 units. Female gender was significantly associated with overall score in univariate model ($\beta = -10.7$; 95% CI, -18.3 to -3.2; $p = 0.006$) and was not significantly associated with quality-of-life scores while adjusting for other factors. (Table 4).

Discussion

Quality of life is an important factor in understanding the impact of a disease and evaluating the effectiveness of healthcare interventions.^[25] To understand the effect of a

disease on a patient's QoL, it is important to evaluate the importance of symptoms/disabilities.

Our study shows that the score for mental health and dependency subscale was lowest suggesting that these factors were the most affected. A study done by Ji MIN et al in Korean population showed that anxiety and depression are the two most common encountered disorders in an ophthalmic patient.^[24] These findings were similar to our study. Skalicky and Goldberg et al reported that depression was more prevalent with increasing severity in glaucoma, in patients aged 70-79 years using the Nelson Glaucoma Severity Scale and the Geriatric Depression Scale-15 questionnaire, and that older age was a risk factor for depression.^[26] In our study not only was the average age group 64 years but also the patients were monocular which increased the prevalence of depression among our patients, correlating with previous studies.

Half of our study patients especially those with glaucoma revealed that they don't enjoy social functions and avoid going to them because of their eye problem. Studies regarding the biopsychosocial profiles of an ophthalmic patients were performed in Brazil in 2006 and 2008.^[27,28] Common findings between these two studies and our study was that monocular patients become increasingly shy in their social relationships because of their disability. The loss of an eye, regardless of whether it is due to a serious disease or injury, can disturb a patient's life.

Multiple linear regression analysis demonstrated that best corrected visual acuity in better eye was the predictor of vision-related quality of life in these group of patients (P value < 0.001). Female gender was significantly associated with lower quality of life score compared to male in univariate linear regression model ($P = 0.006$). Sherwood

et al showed that female gender had low activities of daily vision scale (ADVS) scores and a poor quality of life.^[4] Ji Min et al found that female gender was associated with lower QoL, and were more sensitive towards the symptoms of their disease, thus experiencing a greater negative impact on their QoL.^[24] These could be the reasons of experiencing a poor QoL among female gender in our study also. Monocularity, female gender and older age were the probable factors in our study, which affected psychosocial health and thus the QoL in these patients.

In our study, we found mental health disturbance and dependency as the main factors affecting the QoL, followed by dark adaptation & glare and distant vision problems. Nelson et al, in their study found, dark adaptation and glare to be the factor responsible for the lowest visual performance among the glaucoma patients.^[8] In addition to a generalized reduction in vision related quality of life, monocular patients report specific problems with seeing objects in their peripheral visual fields and feel that they accomplish less or are limited in the length of their participation in work or other activities.^[22] Similar results were found in our study. Many of our participants stated that while walking they faced problems in noticing any animals/vehicles or perceiving the speed breakers and holes on the road. Majority of our patients had a feeling of being a burden on their family members.

Median composite score for group 1 was 54.62 and for group 2 was 45.38. The score was lower in control group than those in glaucoma patients but the difference was not statistically significant between the groups ($P = 0.367$). Patients in both the groups faced similar problems, more or less to the same extent. QoL in monocular patients with glaucoma and patients of other

etiology are poor. More attention should be given to monocular patients for reducing their fear of blindness at diagnosis and over time, because these patients are more worried about the loss of vision in their only remaining functional eye. Special attention should be paid to glaucoma patients since these patients are more worried due to bilateral involvement of glaucoma and the fear of complete blindness. As per the results of our study we concluded that it is important to provide accurate and appropriate information about glaucoma at every visit by expert health care professionals to prevent patients from developing undue anxiety and depression. Continued efforts to refine QoL assessment will further our understanding about the impact of glaucoma on the lives of millions of patients.^[29] More work is needed to delineate the systemic, psychological and ocular influences of QoL in glaucoma patients.^[26,30-31]

Quality of life assessment is subjective; two patients with similar loss of visual ability from glaucoma may rate their QoL differently. Personality and other psychological factors may influence how questions are answered. Some will have a tendency to minimize, while others may over-emphasize their functional impairment.^[32] Limitations of our study are certain factors such as marital status and employment status of patients, which were found to have an effect on QoL, were not included in the study.

To our knowledge, our study is the first study to assess QoL in monocular glaucoma patients in Indian population, with largest sample size among monocular studies reported so far. Also in our study we have compared the differences in VRQoL of monocular visual loss in patients with different etiologies.

Conclusion

Monocular patients have poor general and vision related quality of life. Depression associated with monocularity and the perception of dependency and being a burden on their family members greatly impacted the mental health of the participants. Patients must be educated about the disease and its association with lifelong treatment. Monocular patients must be given attention, especially those affected by glaucoma, for reducing their fear of blindness.

Abbreviations

QoL – Quality of life

NEI-VFQ - National Eye Institute Visual Functioning Questionnaire

IND-VFQ - Indian Vision Function Questionnaire

VA – Visual acuity

VRQoL - vision related quality of life

POAG – Primary open angle glaucoma

PACG – Primary angle closure glaucoma

IOP – Intraocular pressure

BCVA - Best corrected visual acuity

MD – Mean Deviation

dB – Decibel

Log Mar - Logarithm of minimum angle of resolution

References

1. Kong XM, Zhu WQ, Hong JX, Sun XH. Is glaucoma comprehension associated with psychological disturbance and vision-related quality of life for patients with glaucoma? A cross-sectional study. *BMJ Open*. 2014; May 26;4(5).
2. Spaeth G, Walt J, Keener J. Evaluation of quality of life for patients with glaucoma. *Am J Ophthalmol*. 2006;141(1); Suppl: S3-14.

3. Lee BL, Wilson MR. Health-related quality of life in patients with cataract and glaucoma. *J Glaucoma*. 2000;9(1):87-94.
4. Sherwood MB, Garcia-Siekavizza A, Meltzer MI, Hebert A, Burns AF, Mc Gorry S. Glaucoma's impact on quality of life and its relation to clinical indicators. A pilot studies. *Ophthalmology*. 1998;105(3):561-6.
5. Wilson MR, Coleman AL, Yu F, Bing EG, Sasaki IF, Berlin K, et al. Functional status and well-being in patients with glaucoma as measured by the Medical Outcomes Study Short Form-36 questionnaire. *Ophthalmology*. 1998;105(11):2112-16.
6. Zimmerman TJ, Karunaratne N, Fechtner RD. Glaucoma: outcomeology (part 1) *J Glaucoma*. 1996;5(3):151.
7. Lee PP. Outcomes and endpoints in glaucoma. *J Glaucoma*. 1996;5(4):295-7.
8. Nelson P, Aspinall P, Pappasouliotis O, Worton B, O'Brien C. Quality of life in glaucoma and its relationship with visual dysfunction. *J Glaucoma*. 2003;12(2):139-50.
9. De Boer MR, Moll AC, de Vet HC, Terwee CB, Völker-Dieben HJ, van Rens GH. Psychometric properties of vision-related quality of life questionnaires: a systematic review. *Ophthalmic Physiol Opt*. 2004;24(4):257-73.
10. Mangione CM, Lee PP, Gutierrez PR, Spritzer K, Berry S, Hays RD. National Eye Institute Visual Function Questionnaire Field Test Investigators. Development of the 25-item National Eye Institute Visual Function Questionnaire. *Arch Ophthalmol*. 2001;119(7):1050-8.
11. Gothwal VK, Reddy SP, Sumalini R, Bharani S, Bagga DK. National Eye Institute visual function questionnaire or Indian vision function questionnaire for

visually impaired: A conundrum. *Invest Ophthalmol Vis Sci.* 2012;53(8):4730-8.

12. Gupta SK, Viswanath K, Thulasiraj RD, Murthy GV, Lamping DL, Smith SC, et al. The development of the Indian vision function questionnaire: field testing and psychometric evaluation. *Br J Ophthalmol.* 2005;89(5):621-7.

13. Wu P, Xi S, Xia H, Lu H, Guo W. Survey on vision-related quality of life and self-management among patients with glaucoma. *J Glaucoma.* 2014;23(2):75-80.

14. Freeman EE, Egleston BL, West SK, Bandeen-Roche K, Rubin G. Visual acuity change and mortality in older adults. *Invest Ophthalmol Vis Sci.* 2005;46(11):4040-5.

15. Gutierrez P, Wilson MR, Johnson C, Gordon M, Cioffi GA, Ritch R, et al. Influence of glaucomatous visual field loss on health-related quality of life. *Arch Ophthalmol.* 1997;115(6):777-84.

16. Jampel HD. Glaucoma patients' assessment of their visual function and quality of life. *Trans Am Ophthalmol Soc.* 2001; 99:301-17.

17. Haymes SA, LeBlanc RP, Nicolela MT, Chiasson LA, Chauhan BC. Risk of falls and motor vehicle collisions in glaucoma. *Invest Ophthalmol Vis Sci.* 2007;48(3):1149-55.

18. Chia EM, Wang JJ, Rochtchina E, Smith W, Cumming RR, Mitchell P. Impact of bilateral visual impairment on health-related quality of life: the Blue Mountains Eye Study. *Invest Ophthalmol Vis Sci.* 2004;45(1):71-6.

19. Coleman AL, Stone K, Ewing SK, Nevitt M, Cummings S, Cauley JA, Ensrud KE, Harris EL, Hochberg MC, Mangione CM. Higher risk of multiple falls among elderly women who lose visual acuity. *Ophthalmology.* 2004;111(5):857-62.

20. Colo'n-Emeric CS, Biggs DP, Schenck AP, Lyles KWRisk factors for hip fracture in skilled nursing facilities: who should be evaluated? *Osteoporos Int.* 2003;14(6):484-9.

21. Klein BEK, Moss SE, Klein R, Lee KE, Cruickshanks KJ. Associations of visual function with physical outcomes and limitations 5 years later in an older population: the Beaver Dam eye study. *Ophthalmology.* 2003;110(4):644-50.

22. Kondo T, Tillman WT, Schwartz TL, Linberg JV, Odom JV. quality of life after surgical removal of an eye. *Ophthal Plast Reconstr Surg.* 2013;29(1):51-6.

23. Hirneiss C, Neubauer AS, Herold TR, Kampik A, Hintschich C. Utility values in patients with acquired anophthalmus. *Orbit.* 2009;28(6):332-6.

24. Ahn JM, Lee SY, Yoon JS. Health-related quality of life and emotional status of anophthalmic patients in Korea. *Am J Ophthalmol.* 2010;149(6):1005-1011.e1.

25. Béchetoille A, Arnould B, Bron A, Baudouin C, Renard JP, Sellem E, et al. Measurement of health-related quality of life with glaucoma: validation of the Glau-quality of life 36-item questionnaire. *Acta Ophthalmol.* 2008;86(1):71-80.

26. Skalicky S, Goldberg I. Depression and quality of life in patients with glaucoma: a cross-sectional analysis using the Geriatric Depression Scale-15, assessment of function related to vision, and the Glaucoma Quality of Life-15. *J Glaucoma.* 2008;17(7):546-51.

27. Cabral LG, Martelli Júnior H, Leite DM, Sabatini Júnior D, Freitas AB, Miranda RT, et al. *Arq Bras Oftalmol.* 2008;71(6):855-9.

28. Nico demo D, Ferreira LM. Questionnaire of the psychosocial profile of the patients with anophthalmia with indication of ocular prosthesis. *Arq Bras Oftalmol.* 2006;69(4):463-70.

29. Khadka J, Pesudovs K, McAlinden C, Vogel M, Kernt M, Hirneiss C. Reengineering the glaucoma quality of life-15 questionnaire with rasch analysis. Invest Ophthalmol Vis Sci. 2011;52(9):6971-7.

30. Skalicky SE, Goldberg I, McCluskey P. Ocular surface disease and quality of life in patients with glaucoma. Am J Ophthalmol. 2012;153(1):1-9.

31. Evans K., Law S.K., Walt J., Buchholz P., Hansen J. The quality-of-life impact of peripheral versus central vision loss with a focus on glaucoma versus age-related macular degeneration. Clin. Ophthalmol. 2009; 3:433–445.

32. Skalicky S, Goldberg I. Quality of life in glaucoma patients. US Ophthal Rev. 2013;06(1):6-9.

Legend Tables

Table1: Demographic and clinical characteristics of the study participants

	Case (n=129)	Control (n=67)	Total (n=196)	P-value ^a
Age, years Mean ±SD	64.71 ±9.5	62.70 ±10.4	64.03 ±9.8	0.174 ^b
Male gender, n (%)	69 (53.5)	41 (61.2)	110 (56.1)	0.302
Educated, n (%)	87 (67.4)	47 (70.2)	134 (68.4)	0.699
Duration of monocularly Median (IQR), months	84 (36 to 132)	60 (12 to 96)	72 (24 to 120)	0.036 ^c
Family history, n (%)	5 (3.9)	Nil	5 (2.6)	0.168
Systemic illness, n (%)	29 (22.5)	15 (22.4)	44 (22.4)	0.988
Lens status, n (%)				
Phakic	60 (46.9)	40 (58.8)	100 (51.0)	0.111
Pseudophakia	68 (53.1)	28 (41.1)	96 (49.0)	
IOP in better eye, mmHg Mean ±SD	13.94 ±4.2	14.87 ±3.8	14.26 ±4.0	0.132 ^b
BCVA in better eye Median (IQR), log MAR	0 (0 to 0.18)	0.18 (0 to 0.30)	0 (0 to 0.30)	0.182 ^c
MD in better eye, dB Median (IQR)	-12.50 (-20.9 to -7.1)	-8.20 (-11.1 to -4.1)	-10.84 (-18.4 to -6.5)	0.008 ^c

SD-standard deviation; IQR-interquartile range

IOP-intraocular pressure; BCVA-best corrected visual acuity; MD-mean deviation; log MAR-logarithm of minimum angle of resolution

^a Chi-square test; ^b independent t-test; ^c Mann-Whitney U test; p-value<0.05 statistically significant

Table 2: Comparison of scores of subscales for IND VFQ

IND VFQ – Subscales	Case (n=129)	Control (n=67)	P-value
General vision	58.33(25.0-83.0)	52.06(16.7-75.0)	0.185
Near vision	78.57(53.6-96.4)	67.85(42.1-92.8)	0.206
Distance vision	50.00(0-75.0)	50.00(0-87.5)	0.992
Social function limitation	50.00(0-100.0)	50.00(0-100.0)	0.676
Mental health	0(0-50.0)	0(0-33.3)	0.189
Role limitation	59.06(33.3-83.0)	50.00(33.3-72.2)	0.135
Dependency	0(0-100.0)	0(0-66)	0.277
Color vision`	100(0-100.0)	100.00(0-100.0)	0.821
Peripheral vision	75.00(0-100.0)	75.00(0-100.0)	0.470
Dark adaptation and glare	47.75(12.5-79.1)	37.5(8.0-70.5)	0.277
Overall score	54.62(29.7-74.7)	45.38(23.7-76.7)	0.367

*Subscale scores were presented in median and interquartile range (IQR) and compared using Mann-Whitney U test

Table 3: Comparison of IND VFQ scores of general functioning, psychosocial impact and visual symptom scale

	Case (n=129)	Control (n=67)	P-value
General functioning scale	67.80 (41.1 to 80.8)	54.00 (32.0 to 82.0)	0.252
Psychosocial impact scale	33.02 (0 to 60.0)	19.07 (0 to 53.0)	0.221
Visual symptom scale	42.04 (14.0 to 80.7)	42.05 (28.0 to 76.0)	0.888

*Scores were presented in median and interquartile range (IQR) and compared using Mann-Whitney U test

Table 4: Factors associated with vision related quality of life scores

	Univariate analysis		Multivariable analysis	
	β(95% CI)	P-value	β(95% CI)	P-value
Age, years	0.06(-0.3 to 0.4)	0.776	0.04(-0.3 to 0.4)	0.831
Female gender	-10.75(-18.3 to -3.2)	0.006	-6.03(-13.6 to 1.6)	0.120
Educated	0.51(-7.7 to 8.8)	0.903	0.99(-6.7 to 8.7)	0.799
IOP, mmHg	-0.33(-1.3 to 0.6)	0.489	-0.001(-0.9 to 0.9)	0.998
Monocularity duration, Mon	0.07(0.01 to 0.1)	0.008	0.04(-0.01 to 0.1)	0.139
BCVA, log MAR	-45.4(-60.6 to -30.2)	<0.001	-40.66(-56.5 to -24.8)	<0.001
Controls	-3.09(-11.2 to 5.0)	0.452	-1.14(-8.8 to 6.5)	0.771

β-regression coefficient; CI-confidence interval; p-value <0.05 statistical significant

IOP-intraocular pressure; BCVA-best corrected visual acuity

Table 5: Indian vision function questionnaire (33 items)

In the first section, I am going to ask you how much your vision problem affects you in doing your daily activities. I will read out a choice of four answers and you will choose the one you feel describes you best. If you cannot do, or don't do this activity because of vision, or other reasons, please tell me.

Please tick! Response box

Q. No	General functioning scale	Not at all	A little	Quite a bit	Cannot do this because of my sight
1	Because of your vision how much problem do you have in climbing stairs?				
2	Because of your vision how much problem do you have in making out the bumps and holes in the road when walking?				
3	Because of your vision how much problem do you have in seeing if there are animals or vehicles when walking?				
4	Because of your vision how much problem do you have in finding your way in new places?				
5	Because of your vision how much problem do you have in going to social functions such as weddings?				
6	Because of your vision how much problem do you have in going out at night?				
7	Because of your vision how much problem do you have in finding your way indoors?				
8	Because of your vision how much problem do you have in seeing the steps of the bus when climbing in or out?				
9	Because of your vision how much problem do you have in recognizing people from a distance?				
10	Because of your vision how much problem do you have in recognizing the face of a person standing near you?				
11	Because of your vision how much problem do you have in locking or unlocking the door?				

12	Because of your vision how much problem do you have in doing your usual work either in the house or outside?				
13	Because of your vision how much problem do you have in doing your work up to your usual standard?				
14	Because of your vision how much problem do you have in searching for things at home?				
15	Because of your vision how much problem do you have in seeing outside in bright sunlight				
16	Because of your vision how much problem do you have in seeing when coming into the house after being in the sunlight?				
17	Because of your vision how much problem do you have in seeing differences in colors?				
18	Because of your vision how much problem do you have in making out differences in coins or notes?				
19	Because of your vision how much problem do you have in going to the toilet?				
20	Because of your vision how much problem do you have in seeing objects that may have fallen in the food?				
21	Because of your vision how much problem do you have in seeing the level in the container when pouring?				

In the next section, I am going to ask you how you feel because of your eye problem, I will read out a choice of four answers and you will choose the one you feel describes you best.

Please tick! response box

Q.NO	Psychosocial impact scale	Not at all	A little	Quite a bit	Cannot do this because of my sight
22	Because of your eye problem do you feel frightened to go out at night?				
23	Because of your eye problem do you enjoy social functions less?				

24	Because of your eye problem do you ashamed that you can't, see?				
25	Because of your eye problem do you feel you have become a burden on others?				
26	Because of your eye problem do you feel frightened that you may lose your remaining vision?				

In the next section, I am going to ask you to what extent do you have the following eye problems. I will read out a choice of four answers and you will choose the one you feel describes you best.

Please tick! response box

Q.NO	Visual symptom scale	Not at all	A little	Quite a bit	Cannot do this because of my sight
27	Do you have reduced vision?				
28	Are you dazzled in bright light?				
29	Is your vision blurred in sunlight?				
30	Does bright light hurt your eyes?				
31	Do you close your eyes because of light from vehicles?				
32	Does light seem like stars?				
33	Do you have blurred vision?				

Figure 1: Patient population enrolled in the study.

