Vision-Related Quality Of Life And Visual Outcome From Cataract Surgery In Patients With Diabetic Retinopathy

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Abstract

Background: Diabetic retinopathy (DR) and cataract are major contributors to vision impairment in aging diabetic populations. While cataract surgery improves visual acuity, its effect on vision-related quality of life (VRQoL) in DR patients remains under-explored in Indian settings.
Aim: To assess changes in visual acuity and VRQoL following cataract surgery in patients with DR, using the validated Indian Visual Functioning Questionnaire-33 (IND-VFQ-33).
Methods: A hospital-based cross-sectional study was conducted on 94 patients with severe NPDR or PDR undergoing small incision cataract surgery (SICS) with PCIOL implantation. Preoperative and 1-month postoperative best-corrected visual acuity (BCVA) and IND-VFQ-33 scores were compared using paired t-tests (SPSS v22).
Results: Mean BCVA improved significantly from 0.92 ± 0.24 to 0.32 ± 0.18 logMAR ($p < 0.001$). VRQoL scores rose from 58.6 ± 12.3 to 82.4 ± 10.7 ($p < 0.001$), with significant gains across subdomains of mobility, daily activities, and emotional well-being.
Conclusion: Cataract surgery significantly enhances both visual function and quality of life in DR patients. Integrating culturally validated patient-reported outcome measures such as IND-VFQ-33 into routine cataract services strengthens evidence-based public health policy for diabetic populations in low- and middle-income countries.

Introduction

Diabetes mellitus poses a growing global health burden, with India home to over 77 million individuals affected as of 2021. Among its most visually debilitating complications are diabetic retinopathy (DR) and cataract, which frequently coexist in aging diabetic individuals[1,2,3].
In diabetic patients, early cataract formation is linked to oxidative stress, sorbitol accumulation, and non-enzymatic glycation of lens proteins[4].
While cataract extraction is known to restore visual clarity, its outcomes in patients with diabetic retinopathy have traditionally been viewed with caution due to concerns of macular edema, DR progression, or suboptimal visual recovery[5]. However, recent evidence from South Asian cohorts, including Bangladesh and India, shows that with appropriate perioperative care, cataract surgery leads to significant visual improvements in DR patients without worsening retinopathy[4,6].
Moreover, best-corrected visual acuity (BCVA), though a vital clinical measure, may not fully reflect the patient's visual functioning or psychological well-being. This has shifted attention toward patient-reported outcome measures (PROMs) like vision-related quality of life (VRQoL) instruments. These tools allow better understanding of patient functioning, independence, and emotional well-being—particularly valuable in chronic conditions like DR, where objective acuity may not fully reflect patient disability [7]. The Indian Visual Function Questionnaire-33 (IND-VFQ-33), validated by Khanna et al.

[8], is tailored to the Indian population and assesses multiple domains, including visual function, daily activities, and emotional health.
The dual burden of cataract and diabetic retinopathy constitutes a major cause of avoidable blindness in South Asia. Addressing functional recovery through patient-centered outcomes is critical to achieving WHO's Vision 2030 and Sustainable Development Goals (SDG 3.8 on Universal Health Coverage
This study aims to bridge the gap between clinical and real-life functional outcomes by evaluating both VA and VRQoL following cataract surgery in DR patients. Despite numerous studies assessing visual outcomes post-cataract surgery, limited Indian data evaluates the subjective impact on quality of life among DR patients. This study addresses that gap by integrating PROMs with clinical metrics.

Materials and Methods

Ethics Clearance
Approval was obtained by the Institutional Ethics Committee of Sri Devaraj Urs Medical College, Kolar (Ref. No: SDUAHER/KLR/R&D/CEC/S/PG/140/2024-25).
The study adhered to the Declaration of Helsinki

Study Design & Duration
A hospital-based cross-sectional observational study conducted from January to August 2025 at R.L. Jalappa Hospital, Kolar.

Sample Size Calculation
Based on a previous study by Zhu et al.[10], using preoperative VRQoL (76.02 ± 24.82) and postoperative VRQoL (95.35 ± 20.65), with 80% power and 95% confidence, the required sample was 94.

Inclusion Criteria
- Age 40–70 years
- Diagnosed severe NPDR or PDR
- Presence of operable cataract
- No previous ocular surgery
- Provided informed consent

Exclusion Criteria
- Non-diabetic retinopathies (e.g., hypertensive, radiation-induced)
- Macular pathologies (e.g., ARMD, macular hole)
- Uncontrolled systemic diseases
- Dense vitreous hemorrhage or media opacity

Clinical Evaluation

Clinical Workup
All patients underwent comprehensive ophthalmic evaluation including:
- BCVA (logMAR)
- IOP (Goldmann applanation)
- Slit-lamp and fundus examination
- Systemic investigations (FBS, PPBS, HbA1c, serum creatinine)

The IND-VFQ-33 questionnaire was administered in the local language preoperatively and at 1 month post-surgery[8].

Surgical Protocol
- All surgeries were SICS with PCIOL implantation under peribulbar anesthesia by experienced surgeons.

Postoperative Care

- Topical antibiotics + steroids for 6 weeks
- Follow-up at Day 1, Day 7 and 1 Month
- BCVA and IND-VFQ-33 reassessed at 1 month

Statistical Analysis

Data analyzed using SPSS v22. Normality was assessed using the Shapiro–Wilk test. Continuous data were expressed as mean ± SD. Paired t-tests compared pre- and postoperative BCVA and VRQoL scores. A p-value < 0.05 was considered statistically significant.

Results

Table 1: Demographics

Parameter	Value (n = 94)
Age (mean ± SD)	61.7 ± 6.2 years
Gender	Male: 54 (57.4%) Female: 40 (42.6%)
Duration of Diabetes (mean ± SD)	11.2 ± 4.5 years
Type of DR	Severe NPDR: 62 (66.0%) PDR: 32 (34.0%)
Pre-op FBS (mean ± SD)	146.8 ± 32.7 mg/dL
Pre-op HbA1c (mean ± SD)	7.6 ± 0.9%

Figure 1: Age Distribution of Study Participants

Bar graph depicting the age-wise distribution of diabetic retinopathy patients undergoing cataract surgery.

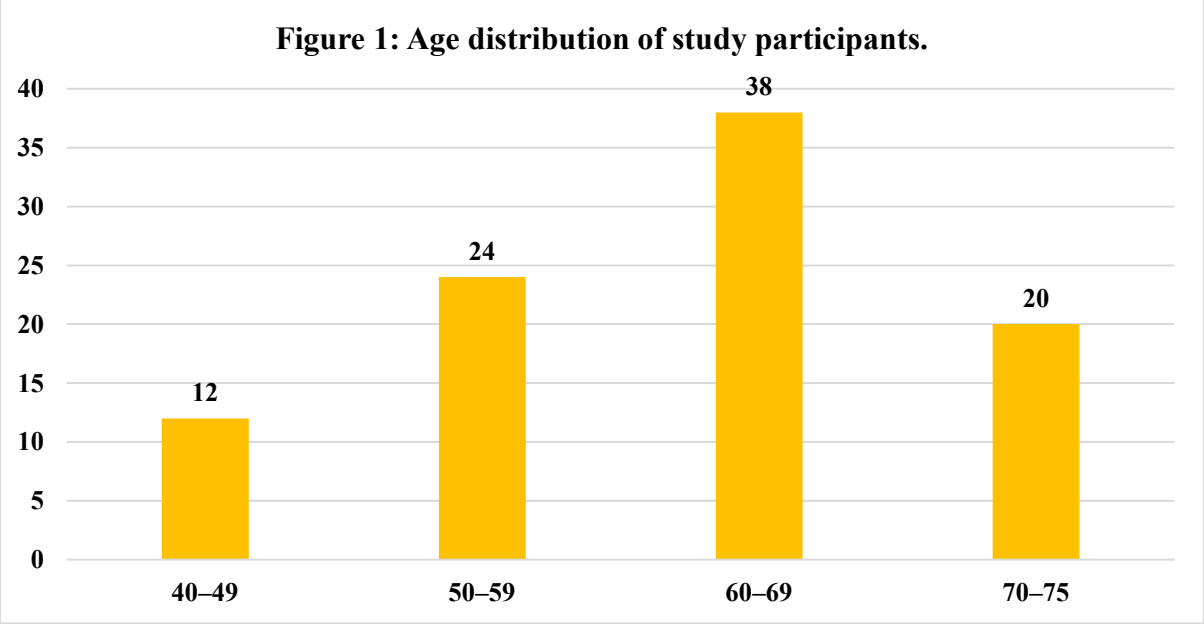
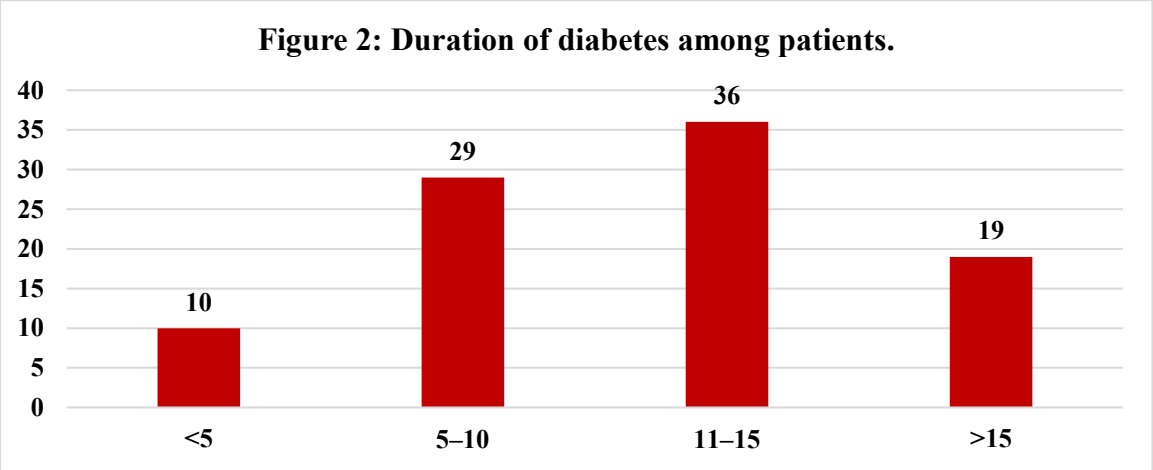


Figure 2: Duration of Diabetes Among Participants

Bar chart showing the distribution of diabetes duration among study subjects

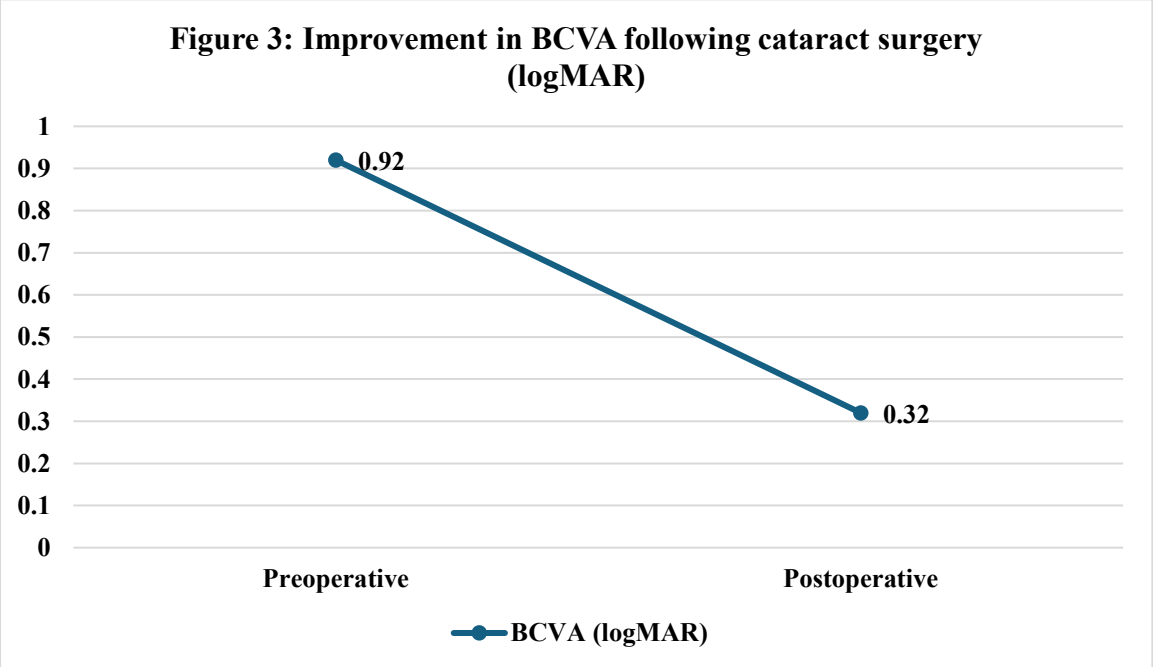


Visual Acuity Outcomes

- Pre-op BCVA: 0.92 ± 0.24 logMAR
- Post-op BCVA: 0.32 ± 0.18 logMAR
- **p < 0.001** (statistically significant)

Figure 3: Change in Best-Corrected Visual Acuity (BCVA) Pre- and Postoperatively

Line graph illustrating the mean improvement in BCVA (logMAR) from baseline to 1 month after cataract surgery.



A significant improvement in mean BCVA was observed postoperatively (0.92 to 0.32 logMAR, $p < 0.001$), as shown in Figure 3.

Vision-Related Quality of Life (VRQoL)

- Pre-op score: 58.6 ± 12.3
- Post-op score: 82.4 ± 10.7
- Mean gain: **23.8 points** ($p < 0.001$)

Table 2: Vision-Related Quality of Life Scores (IND-VFQ-33)

Domain	Pre-op Mean ± SD	Post-op Mean ± SD	p-value
Overall VRQoL Score	58.6 ± 12.3	82.4 ± 10.7	< 0.001
Mobility	41.2 ± 10.5	75.8 ± 11.1	< 0.001
Daily Activities	53.6 ± 13.1	85.7 ± 9.3	< 0.001
Emotional/Psychosocial	49.3 ± 11.4	82.1 ± 10.6	< 0.001

Figure 4: Preoperative and Postoperative Subdomain Scores of Vision-Related Quality of Life (IND-VFQ-33)
Bar graph comparing scores in mobility, daily activities, and emotional wellbeing before and after cataract surgery in DR patients.

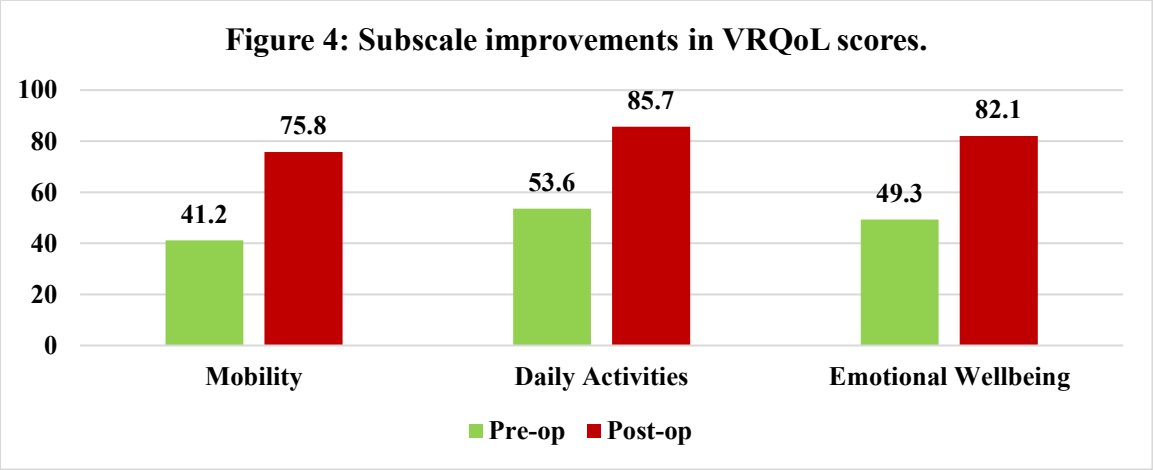


Figure 4: Shows significant subdomain-level improvements in VRQoL, with notable gains in mobility, daily functioning, and emotional well-being.

Figure 5: Overall Vision-Related Quality of Life Scores (IND-VFQ-33) Before and After Surgery
Line graph showing overall improvement in VRQoL scores pre- and postoperatively.

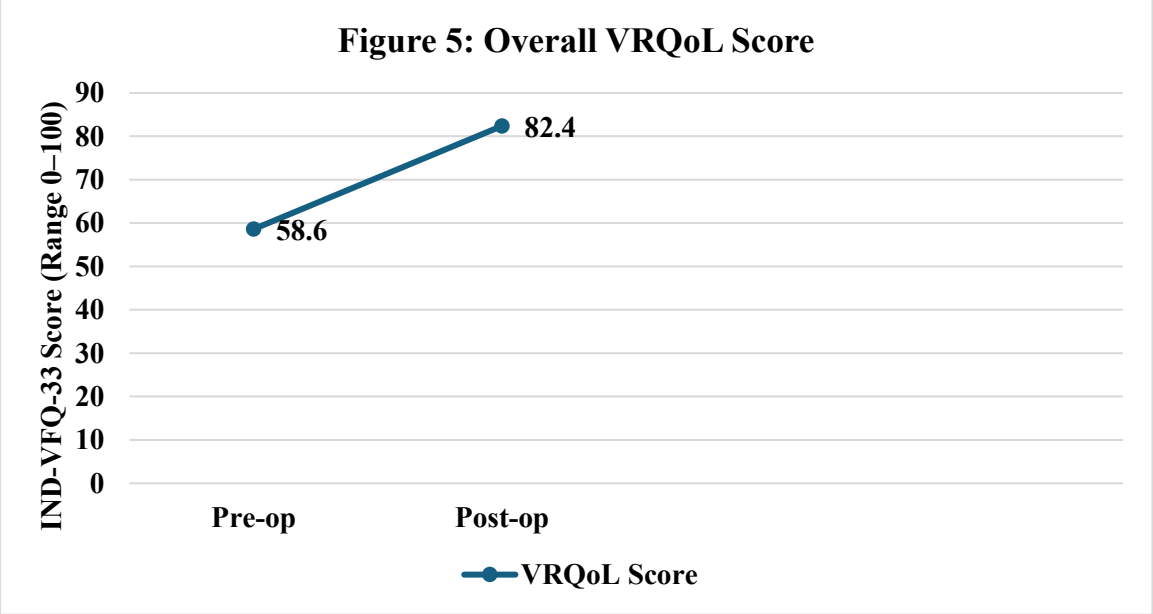


Figure 5. Line chart showing improvement in overall VRQoL scores (IND-VFQ-33) before and after surgery ($p < 0.001$).

Table 3: Postoperative Complications

Complication	Number (%)
Mild Corneal Edema	7 (7.4%)
PCO, Endophthalmitis, CME	0
DR Progression	0

Postoperative complications were minimal. Mild, transient corneal edema occurred in 7 patients (7.4%) and resolved with medical management. No cases of endophthalmitis, cystoid macular edema, PCO, or DR progression were observed during the 1-month follow-up (Table 3)

Discussion

This study confirms that cataract surgery not only improves objective visual acuity but also leads to meaningful gains in functional vision and quality of life among DR patients. The observed visual gain of 0.6 logMAR exceeds the minimum clinically important difference (MCID) and supports the utility of timely cataract extraction even in the presence of diabetic retinopathy.

The postoperative improvement in logMAR BCVA (from 0.92 to 0.32) is consistent with other Indian and global studies[10,11]. Our findings are in agreement with those of Gupta et al. (2019) and Heemraz et al. (2018), who reported enhanced QoL in DR patients following cataract surgery, although most previous studies lacked standardized VRQoL assessment tools.

However, the subjective improvement in VRQoL is perhaps even more noteworthy. A 23.8-point rise in IND-VFQ-33 scores reflects profound gains in functional independence, psychological wellbeing, and social participation. The IND-VFQ-33, tailored specifically for Indian sociocultural contexts, ensures a psychometrically sound and culturally relevant interpretation of visual functioning and quality of life. Its structured subdomains enhance the granularity of postoperative assessment. These outcomes are particularly valuable in DR patients, who often experience compounding visual and emotional burdens[12,13].

Analysis of IND-VFQ-33 subdomains demonstrated consistent improvement across mobility, daily activities, and psychosocial functioning, reinforcing the multifaceted benefits of vision restoration. This supports the growing consensus that PROMs must complement traditional visual outcomes, especially in patients with chronic retinal disease[7].

Importantly, despite historical concerns of DR worsening post-surgery, no such progression was noted in our cohort. This could be attributed to optimal glycemic control, careful surgical planning, and the use of small incision cataract surgery (SICS), aligning with findings from Bourne et al.[4] and Haripriya et al.[6], who reported favorable visual and safety outcomes in DR patients post-cataract surgery in similar South Asian settings.

Unlike prior Indian studies, our research uniquely integrates both patient-reported outcome measures and clinical metrics in a real-world DR population undergoing SICS—a cost-effective and widely used surgical technique in low- and middle-income countries (LMICs).

Routine integration of PROMs like IND-VFQ-33 in national blindness control programs could guide resource allocation and patient counseling.

To our knowledge, this is one of the few Indian studies to quantitatively link cataract surgery in DR patients with VRQoL outcomes using a culturally validated tool.

Strengths of our study include:

- Use of a validated indigenous tool (IND-VFQ-33)
- Inclusion of real-world DR patients
- Focus on both objective and subjective outcomes

Limitations:

- Single-center study
- Short follow-up (1 month)
- Lack of OCT to assess macular status

Future Directions:
Long-term multicentric studies incorporating OCT, fundus photography, and DR staging pre- and post-surgery will provide deeper insights into both anatomical and functional visual recovery.

Conclusion
Cataract surgery in patients with diabetic retinopathy delivers not only objective visual gains but also transformative improvements in independence and well-being. Incorporating PROMs such as IND-VFQ-33 into cataract programs strengthens patient-centered care and informs public health strategies in LMICs.

Conflict of Interest
The authors declare no conflicts of interest.

Funding
No external funding was received for this study.

IND VFQ-33 [14]

IND VFQ-33

Question	No difficulty	A little	Quite a bit	A lot	Cannot do this
Because of your vision, how much problem do you have in climbing stairs?	1	2	3	4	5
Because of your vision, how much problem do you have in making out the bumps and holes in the road when walking?	1	2	3	4	5
Because of your vision, how much problem do you have in seeing if there are animals or vehicles when walking?	1	2	3	4	5
Because of your vision, how much problem do you have in finding your way in new places?	1	2	3	4	5
Because of your vision, how much problem do you have in going to social functions such as weddings?	1	2	3	4	5
Because of your vision, how much problem do you have in going out at night?	1	2	3	4	5
Because of your vision, how much problem do you have in finding your way indoors?	1	2	3	4	5
Because of your vision, how much problem do you have in seeing the steps of the bus when climbing in or out?	1	2	3	4	5
Because of your vision, how much problem do you have in recognizing people from a distance	1	2	3	4	5
Because of your vision, how much problem do you have in recognizing the face of a person standing near you?	1	2	3	4	5
Because of your vision, how much problem do you have in locking or unlocking the door?	1	2	3	4	5
Because of your vision, how much problem do you have in doing your usual work either in the house or outside?	1	2	3	4	5
Because of your vision how much problem do you have in doing your work up to your usual standard?	1	2	3	4	5
Because of your vision, how much problem do you have in searching for things at home?	1	2	3	4	5
Because of your vision, how much problem do you have in seeing outside in bright sunlight	1	2	3	4	5
Because of your vision, how much problem do you have in seeing when coming into the house after being in the sunlight?	1	2	3	4	5
Because of your vision, how much problem do you have in seeing differences in colors?	1	2	3	4	5
Because of your vision, how much problem do you have in making out differences in coins or notes?	1	2	3	4	5
Because of your vision, how much problem do you have in going to the toilet?	1	2	3	4	5
Because of your vision, how much problem do you have in seeing objects that may have fallen in the food?	1	2	3	4	5
Because of your vision, how much problem do you have in seeing the level in the container when pouring?	1	2	3	4	5
Psychosocial Impact Scale Because of your eye problem, do you feel frightened to go out at night?	1	2	3	4	5
Because of your eye problem, do you enjoy social functions less?	1	2	3	4	5
Because of your eye problem, are you ashamed that you can't see?	1	2	3	4	5
Because of your eye problem, do you feel you have become a burden on others?	1	2	3	4	5
Because of your eye problem, do you feel frightened that you may lose your remaining vision?	1	2	3	4	5
Visual Symptom Scale Do you have reduced vision?	1	2	3	4	5
Are you dazzled by bright light?	1	2	3	4	5
Is your vision blurred in sunlight?	1	2	3	4	5
Does bright light hurt your eyes?	1	2	3	4	5
Do you close your eyes because of light from vehicles?	1	2	3	4	5
Does light seem like stars?	1	2	3	4	5
Do you have blurred vision?	1	2	3	4	5

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