

Influence of visual acuity level on sexual function in patients with cataract

Veysel Cankurtaran, Serdar Ozates¹, Melike Ezerbolat Ozates², Serkan Ozler³

Purpose: To assess the association of sexual function with visual acuity. **Methods:** Patients were included in the mild to moderate visual impairment (MVI), severe visual impairment (SVI), and profound visual impairment (PVI) groups based on bilateral corrected distance visual acuity. All patients completed the Turkish version of the International Index of Erectile Function (IIEF) and Glombok-Rust Inventory of Sexual Satisfaction (GRISS) scales before and at 1 month after the cataract surgery. **Results:** Mean IIEF scores did not improve after cataract surgery in the MVI group ($P > 0.05$). Sexual desire, intercourse satisfaction, overall satisfaction, and total IIEF score were significantly improved after cataract surgery in both the SVI and PVI groups ($P < 0.05$). Mean GRISS subscale scores did not improve after cataract surgery in the MVI group ($P > 0.05$). Non-sensuality, avoidance, dissatisfaction, infrequency, noncommunication, and total GRISS score were significantly improved after cataract surgery in both the SVI and PVI groups ($P < 0.05$). **Conclusion:** The study results documented the association of low visual acuity and decreased sexual desire and satisfaction and revealed the beneficial effect of visual improvement.

Key words: Cataract, sexual function, sexuality, visual impairment

Good perception of the external world with the senses is critical for sexual arousal and sexual activity.^[1,2] Previously, studies have shown that impairments in hearing, taste, touch, or olfaction led to sexual dysfunction of varying degrees.^[3-5] The sight has been considered as one of the major senses and gathers most of the information one has regarding the external world. Eyes receive light and transform it into neural impulses; the visual cortex then processes those impulses according to its internal logic.^[6] A person who is born blind cannot interpret visual expressions; however, a person with acquired visual dysfunction may experience the negative burden of decreased visual expressions.^[6] Previous studies have focused on the association of permanent visual impairment or blindness with sexual activity; however, they failed to accurately consider the effects of temporary visual impairment on sexual arousal and activity.^[7,8]

A cataract is one of the leading causes of visual impairment in the world.^[9] Although cataracts can be treated successfully, the sight-limiting effects of the cataract may restrict the quality of life and social interactions of patients who hesitate to receive surgery or who cannot receive proper surgical intervention. The ability to construct social interactions is critical for good sexual relations. Previous studies have indicated that sexuality and sexual satisfaction are multifactorial and that visual function had a great influence.^[8,10]

Despite the technical advances and high success rates in cataract surgery, knowledge regarding the functional and psychological effects of cataract surgery is limited and prone to

further exploration in new clinical investigations. We hypothesize that sexual activity and erectile function may improve with increased visual function and improved visual perception of the external world in patients who receive cataract surgery. The present study, thus, aimed to investigate the association of sexual function and satisfaction with visual acuity improvement.

Methods

This perspective and observational study was conducted at the ophthalmology department of a tertiary referral hospital in accordance with the ethical standards of the Declaration of Helsinki. The study protocol was approved by the institutional board of our hospital's ethics committee. All included patients granted written informed consent prior to all surgical procedures and assessing psychological scales.

Patients with bilateral cataract or monocular patients with cataract were included in the study. Patients with a history of cardiovascular diseases, diabetes mellitus, unregulated hypertension, surgery associated with erectile dysfunction, medical treatment for erectile dysfunction, hormone replacement therapy, hearing loss, taste disorders, smell disorders, touch disorders, depression, anxiety, bipolar disease, or schizophrenia were excluded. Patients that use antihypertensive and anticholesterol medications such as β -adrenergic receptor blockers, thiazide-type diuretics, and aldosterone receptor blockers, which were associated with erectile and sexual dysfunctions, were also excluded.

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Department of Ophthalmology, Medical School of Mustafa Kemal University, Hatay, ²Department of Urology, Medical School of Mustafa Kemal University, Departments of ¹Ophthalmology and ²Psychiatry, Kars Harakani State Hospital, Kars, Turkey

Correspondence to: Dr. Serdar Ozates, Yenişehir Mahallesi, İsmail Aytemiz Blv. No: 55, 36200 Merkez, Kars, Turkey. E-mail: serdarozates@gmail.com

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Additionally, patients with dyschromatopsia, bilateral corneal disorders such as corneal ectasia, uveitis, vitreoretinal diseases, or glaucoma were excluded.

All patients underwent a complete physical examination by a urologist and an ophthalmologist preoperatively and their examination findings and medical history were noted. Plasma glucose level and lipid profile were evaluated and electrocardiography and blood pressure measurements were performed. Body mass index (BMI) and smoking status were noted. A complete ophthalmological examination including corrected distance visual acuity (CDVA) assessment with Snellen chart, applanation tonometry, slit-lamp examination, and posterior segment examination was performed by the same clinician before and 1 month after the cataract surgery. The CDVA was converted to a logarithm of the minimum angle of resolution (logMAR) for statistical analysis. Study participants were divided into three groups based on their preoperative visual acuity and the visual standards reported by the International Council of Ophthalmology (ICO) were used to define the groups. Patients with bilateral visual acuity values of between 0.2 and 0.9 logMAR were defined as having mild to moderate visual impairment (MVI) and were included in the MVI group. Separately, those with bilateral visual acuity values of between 1.0 and 1.3 logMAR was defined as having severe visual impairment (SVI) and were included in the SVI group, while those with bilateral visual acuity values of 1.4 to 1.7 logMAR was defined as having profound visual impairment (PVI) and were included in the PVI group. All cataract surgeries were performed by the same surgeon.

All patients completed the Turkish version of the International Index of Erectile Function (IIEF) and a male version of the Glombok-Rust Inventory of Sexual Satisfaction (GRISS) scales before and at 1 month after surgery. The IIEF scale is a multidimensional, self-administered scale that evaluates erectile function, orgasmic function, sexual desire, intercourse satisfaction, and overall satisfaction.^[11] Specifically, questions 1 to 5 and 15 of the IIEF scale evaluate the erectile function, questions 9 and 10 evaluate the orgasmic function, questions 11 and 12 evaluate sexual desire, questions 6 to 8 evaluate the satisfaction with intercourse, and questions 13 and 14 evaluate the overall satisfaction.^[11] The Cronbach's alpha reliability coefficient of the Turkish version of the IIEF was 0.92.^[12] The test-retest reliability of the Turkish version of the IIEF was 0.90.^[12] Each answer to the above questions was scored between zero and five points. Higher scores of each subscale of the IIEF indicated better functionality. The GRISS scale is a multidimensional, self-administered scale that evaluates impotence, premature ejaculation, non-sensuality, avoidance, dissatisfaction, infrequency, and noncommunication.^[13] The Cronbach's alpha reliability coefficient of the Turkish version of the GRISS was 0.92.^[13] Each answer to the questions in the GRISS scale was scored between zero and five points.^[13] Total raw scores were converted into transformed scores ranged between one and nine. Scores equal to or higher than five indicates impairment in the sexual function.^[13] All patients also completed the Turkish version of the hospital anxiety and depression (HAD) scale.^[14] The HAD scale evaluates the presence of depression and anxiety symptoms. In this study, the depression subscale of the HAD (HAD-D) had a Cronbach's alpha reliability coefficient of 0.77.^[14] The total HAD-D score can range between zero and 21 points, and a HAD-D score of greater than seven points indicates the presence of depression symptoms. Separately, the anxiety subscale of the HAD (HAD-A) had a Cronbach's alpha reliability

coefficient of 0.85.^[14] The HAD-A score also can range between zero and 21 points, and a HAD-A score of greater than 10 points indicates the presence of anxiety symptoms.

A priori statistical power analysis using G*Power software version 3.0.10 (Franz Faul, Universität Kiel, Germany) demonstrated that statistical power of 80% would be achieved with a total sample size of 78 participants, the effect size of 0.361, and an alpha of 0.05. The study outcomes were analyzed using Statistical Package for the Social Science (SPSS Version 22.0, Armonk, NY: IBM Corp) software. The normal distribution assumption of the data was tested by the Shapiro-Wilk test. The categorical data between groups were compared using the Chi-square test. A comparison of the independent data between the groups was performed with the Kruskal-Wallis test and a comparison of the dependent data was performed with the Wilcoxon Signed-Rank test. A level of $P < 0.05$ was assumed statistically significant for all tests and Bonferroni correction was used for multiple comparisons.

Results

A total of 102 patients were enrolled in this study. Twelve patients were excluded from the study due to the presence of depression ($n = 9$) or anxiety ($n = 3$) symptoms according to the HAD scale. Of the 90 patients finally enrolled in the study, 30 were included in the MVI group, 30 were included in the SVI group, and 30 were included in the PVI group. Table 1 presents the demographic data of the study participants and the comparisons between the groups. The mean CDVA values before surgery were 1.50 ± 0.10 , 1.11 ± 0.11 , and 0.66 ± 0.12 logMAR in the MVI, SVI, and PVI groups, respectively. Thus, the mean CDVA before surgery in the MVI group was significantly higher than those in the SVI and PVI groups ($P < 0.001$) and that in the SVI group was higher than that in the PVI group ($P < 0.001$). In comparison, the mean CDVA values after surgery were 0.86 ± 0.85 , 0.90 ± 0.84 , and 0.84 ± 0.91 logMAR in the MVI, SVI, and PVI groups, indicating that the mean CDVA after surgery did not differ significantly between the groups ($P = 0.958$). Further, the mean CDVA significantly improved after cataract surgery in all groups ($P < 0.001$).

Table 2 shows the IIEF outcomes of the patients before and after cataract surgery and within and between the groups. Mean IIEF subscale scores and total IIEF score did not differ before and after cataract surgery in the MVI group. Conversely, erectile function and orgasmic function scores did not differ before and after cataract surgery in both the SVI and PVI groups. Sexual desire, intercourse satisfaction, overall satisfaction, and total IIEF score were significantly improved after cataract surgery in both the SVI and PVI groups. Table 3 shows P values that were produced by comparisons of the IIEF outcomes before and after the cataract surgery between the groups. Erectile function, orgasmic function, overall satisfaction, and total IIEF score did not differ significantly between the three groups before the cataract surgery, while sexual desire and intercourse satisfaction scores were significantly higher in the MVI group than the SVI and PVI groups before cataract surgery but did not differ between the SVI and PVI groups. Erectile function, orgasmic function, sexual desire, intercourse satisfaction, overall satisfaction, and total IIEF score did not differ between the groups after the cataract surgery.

Table 4 shows the GRISS outcomes of the patients before and after cataract surgery. Mean GRISS subscale scores and total

Table 1: Demographic characteristics of the patients and comparison between the groups

	MVI group	SVI group	PVI group	P
Age (years)	61.2±6.42	62.7±5.40	63.43±5.09	0.303
BMI (kg/cm ²)	30.73±4.28	29.4±3.22	29.02±4.11	0.209
Smoker/nonsmoker (n)	12/18	16/14	17/13	0.393
Anti-hypertensive medication (n)	12	12	16	0.487
Anti-cholesterol medication (n)	9	8	11	0.696

MVI: Moderate visual impairment; SVI: Severe visual impairment; PVI: Profound visual impairment; BMI: Body mass index

Table 2: International Index of Erectile Function outcomes before and after the cataract surgery and comparison within the groups

	MVI group			SVI group			PVI group		
	Before	After	P	Before	After	P	Before	After	P
Erectile function	19.5±4.7	19.6±4.8	0.614	20.3±4.1	20.5±4.3	0.317	19.1±4.2	19.3±4.3	0.298
Orgasmic function	6.3±1.7	6.3±1.6	0.593	6.1±1.6	6.2±1.6	0.257	6.1±1.3	6.1±1.3	0.614
Sexual desire	5.5±1.3	5.6±1.2	0.327	4.6±1.1	6.0±1.3	0.001*	4.5±1.3	5.6±1.2	0.001*
Intercourse satisfaction	7.7±1.3	7.6±1.5	0.558	6.4±1.0	7.9±1.7	0.001*	6.7±1.8	7.7±1.9	0.002*
Overall satisfaction	5.8±1.7	5.8±1.8	0.796	5.3±1.4	5.9±1.8	0.004*	5.2±1.6	5.7±1.8	0.027*
Total IIEF score	44.5±9.5	45.0±9.2	0.286	42.7±7.2	46.5±8.7	0.001*	42.1±7.5	44.6±8.8	0.001*

MVI: Moderate visual impairment; SVI: Severe visual impairment; PVI: Profound visual impairment; IIEF: International Index of Erectile Function, *Statistically significant

Table 3: Comparison of International Index of Erectile Function outcomes before and after the cataract surgery between the groups

	Before cataract surgery			After cataract surgery		
	MVI-SVI	MVI-PVI	SVI-PVI	MVI-SVI	MVI-PVI	SVI-PVI
Erectile function	0.450	0.916	0.323	0.408	0.906	0.324
Orgasmic function	0.548	0.306	0.767	0.859	0.496	0.635
Sexual desire	0.009*	0.010*	0.982	0.274	0.585	0.119
Intercourse satisfaction	0.001*	0.007*	0.498	0.552	0.995	0.645
Overall satisfaction	0.288	0.143	0.510	0.614	0.957	0.612
Total IIEF score	0.692	0.511	0.788	0.408	0.906	0.324

MVI: Moderate visual impairment; SVI: Severe visual impairment; PVI: Profound visual impairment; IIEF: International Index of Erectile Function, *Statistically significant

GRISS scores did not differ before and after cataract surgery in the MVI group. Conversely, impotence and premature ejaculation scores did not differ before and after cataract surgery in both the SVI and PVI groups. Non-sensuality, avoidance, dissatisfaction, infrequency, noncommunication, and total GRISS score were significantly improved after cataract surgery in both the SVI and PVI groups. Table 5 shows *P* values that were produced by comparisons of the GRISS outcomes before and after the cataract surgery between the groups. Impotence and premature ejaculation scores did not differ significantly between the three groups before the cataract surgery. Non-sensuality, avoidance, dissatisfaction, infrequency, non-communication, and total GRISS score were significantly lower in the MVI group than the SVI and PVI groups before cataract surgery but did not differ between the SVI and PVI groups except avoidance score. The avoidance score was significantly higher in the PVI group than in the SVI group. All subscale scores and total GRISS scores did not differ between the three groups after the cataract surgery.

The mean HAD-D scores were 3.3 ± 1.8 , 3.7 ± 1.7 , and 3.0 ± 1.9 and the mean HAD-A scores were 4.7 ± 1.9 , 4.9 ± 1.7 , and 4.5 ± 2.0 in the MVI, SVI, and PVI groups, respectively. The mean HAD-D and HAD-A scores did not differ between the groups ($P = 0.341$ and $P = 0.779$, respectively).

Discussion

Erectile function is strictly associated with health conditions and psychological mood.^[15]

Organic dysfunctions such as diabetes mellitus, cardiovascular diseases, penile disorders, and psychological disorders such as depression and anxiety can negatively affect erectile function.^[15] Disorders of the five senses may negatively affect erectile function and sexual arousal as well.^[3-5] However, the effects of sense disorders such as visual impairment generally have been underestimated until the end-stages are reached. Sexual visual cues trigger sexual arousal, and exposure to those visual cues increases one's sexual desire.^[16] Previous studies have indicated that visual function has had a great influence on sexuality and sexual satisfaction in both genders and reported similar comparison between females and males.^[8,16] Heine *et al.* and Strawbridge *et al.* suggested that patients with visual impairment may not perceive visible cues such as eye gaze, facial expressions, and gestures, and the absence of those visible cues may worsen individuals' functionality and well-being.^[17,18]

Previous studies have focused on the association of permanent visual impairment or blindness and sexual interaction in both

Table 4: Glombok-Rust Inventory of Sexual Satisfaction outcomes before and after the cataract surgery and comparison within the groups

	MVI group			SVI group			PVI group		
	Before	After	P	Before	After	P	Before	After	P
Impotence	2.4±1.4	2.4±1.4	0.712	2.3±1.4	2.0±1.3	0.077	2.3±1.5	2.1±1.4	0.344
Premature ejaculation	2.9±1.2	3.0±1.2	0.414	2.6±1.1	2.8±0.9	0.378	3.1±1.2	2.9±1.3	0.281
Non-sensuality	3.6±1.5	3.7±1.5	0.500	5.7±1.3	3.5±1.0	<0.001*	5.6±1.24	3.0±0.9	<0.001*
Avoidance	2.7±1.2	2.7±1.2	0.831	3.7±1.2	2.8±1.3	<0.001*	5.5±1.2	2.7±0.9	<0.001*
Dissatisfaction	3.3±0.8	3.3±0.7	0.536	6.8±1.2	3.6±1.1	<0.001*	6.4±1.2	3.6±0.8	<0.001*
Infrequency	4.0±1.8	3.7±1.6	0.090	5.7±1.2	4.3±1.0	<0.001*	5.3±1.3	3.9±0.8	<0.001*
Non-communication	2.9±1.5	2.8±1.1	0.730	4.9±1.0	3.2±1.1	<0.001*	4.7±1.1	3.5±0.8	<0.001*
Total score	22.0±3.8	21.9±4.2	0.863	32.0±2.8	22.6±3.7	<0.001*	33.1±3.5	21.9±3.7	<0.001*

MVI: Moderate visual impairment; SVI: Severe visual impairment; PVI: Profound visual impairment. *Statistically significant

Table 5: Comparison of Glombok-Rust Inventory of Sexual Satisfaction outcomes before and after the cataract surgery between the groups

	Before cataract surgery			After cataract surgery		
	MVI-SVI	MVI-PVI	SVI-PVI	MVI-SVI	MVI-PVI	SVI-PVI
Impotence	0.820	0.752	0.893	0.320	0.530	0.741
Premature ejaculation	0.349	0.482	0.104	0.427	0.812	0.530
Non-sensuality	<0.001*	<0.001*	0.881	0.494	0.310	0.520
Avoidance	0.007*	<0.001*	<0.001*	0.735	0.665	0.459
Dissatisfaction	<0.001*	<0.001*	0.208	0.436	0.191	0.692
Infrequency	<0.001*	0.002*	0.164	0.191	0.865	0.112
Non-communication	<0.001*	<0.001*	0.538	0.222	0.240	0.375
Total score	<0.001*	<0.001*	0.194	0.370	0.864	0.480

MVI: Moderate visual impairment; SVI: Severe visual impairment; PVI: Profound visual impairment; IIEF: International Index of Erectile Function. *Statistically significant

genders.^[7,8] However, to our knowledge, the effects of visual acuity on sexual relations have not been investigated yet in the literature. Our study results revealed that improvements in visual acuity in patients with mild and MVI, as defined by the ICO, did not affect sexual function. Our study results also suggest that a decrease in visual acuity did not affect sexual function until a critical point. Specifically, binocular visual acuity of 1.0 logMAR or higher (20/200) in patients with severe and PVI, as defined by the ICO, significantly restricts the quality of emotional sexual interaction. In the literature, to our knowledge, no study has reported a cutoff value for visual acuity that negatively affects sexual functionality. Previous studies have reported various cutoff values for visual acuity varying from 0.3 to 0.7 logMAR that negatively affect the vision-related quality of life.^[19-21] Broman *et al.* suggested that the impact of cataract on patient quality of life was driven by its negative effect on visual acuity alone.^[20] Cahill *et al.* noted that patients with a mean visual acuity of 20/100 present difficulties with distance and near tasks and color vision.^[21] Distance, near, and color vision are essential for the perception of sexual visual cues and sexual interactions. Based on our study results and previous reports, visual acuity that negatively affects sexual function is lower than those that restrict daily activity. Previous studies have evaluated the daily activities that are directly associated with quality of sight; however, sight is just one of the five major senses required for a healthy sexual reaction. Therefore, to our knowledge, the impact of sight quality on sexual function in male patients may not be as striking as the impact on vision-related daily activities. This may be an

explanation for why there is a difference between the visual acuity levels that restrict daily activity and sexual function, respectively.

Here, the improvement of visual acuity did not affect the erectile function or orgasmic function. Male sexual function has both psychological and physiological components.^[22] Those components serve with varying dominance levels in each stage of sexual function such as erection and sexual response.^[22] Cortical stimuli and local vascular changes trigger the erection.^[22] Our study results indicated that the quality of visual information had no significant effect on achieving or maintaining an erection. The orgasmic function is influenced by psychosexual mood and recency of sexual activity.^[22] Based on our study results, we can speculate that visual acuity is not a determining factor over orgasmic function. The higher mean age of subjects in our study may be another contributing factor in this regard. Corona *et al.* reported that direct physical stimulation became more important than visual or nongenital excitation in aging males.^[23] Loss of the priority of visual information in sexual function among aging males may mask the influence of visual acuity improvements in our study population. Our observations regarding erectile and orgasmic function should be confirmed in further studies with younger individuals.

Our study highlighted cataract-associated visual impairment as an etiologic factor driving the inability to experience sexual function. Different from permanent visual disability causes, cataract is a treatable ocular disorder and surgical intervention may improve sexual life quality in selected patients.^[24] Our

study revealed that sexual desire, satisfaction, sensuality, and communication improved in patients with a preoperative binocular visual acuity of 1.0 logMAR or more after cataract surgery.

However, the sexual function of some patients did not improve even after they gained increased visual acuity after cataract surgery. Although visual acuity is a quantitative measurement, emotional or psychological factors may also affect how a person perceives their own visual quality.^[25] Perceived visual quality may thus be a factor in patients who did not achieve an improvement in terms of sexual functionality despite their increased visual acuity. Color vision and contrast sensitivity may also affect perceived visual acuity; however, we did not evaluate these variables. Investigating contributing factors to perceived visual acuity may reveal more evidence about the effects of visual acuity on sexual function. Sexual function disorders are multifactorial and there may be other confounding factors such as psychological disorders. Therefore, all patients received the HAD scale to eliminate those with depression or anxiety symptoms from the study.

Male patients who suffer from decreased sexual function typically visit a urologist, and urologists often do not inquire about ophthalmological disorders such as cataract due to a knowledge gap regarding the association between decreased visual acuity and sexual function. Clinicians should consider ophthalmologic disorders as an etiologic factor in cases of decreased sexual function. Referring patients to an ophthalmologist may facilitate treatment for those patients and prevent further unnecessary clinical organic and psychological testing.

There are some limitations to our study. Sexual function has multiple affecting factors and it is difficult to control for all confounding factors or solely evaluate individual factors. Therefore, we excluded major confounding factors from this study; however, unintended impacts of certain other factors may distort our results. Although we excluded confounding factors related to the higher ages, relatively high mean age in the study may distort study results. More significantly, our study only included male patients, so further studies are needed to reveal the effects of visual acuity on sexual function in women and the population overall. As the study population was limited in the present study, further research examining larger populations will also strengthen our suggestions and validate our findings.

Conclusion

In conclusion, the present study documented an association of low visual acuity and decreased sexual desire and satisfaction and revealed the beneficial effects of visual improvement in those patients.

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Conflicts of interest

There are no conflicts of interest.

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