Archives of
Ophtalmological Research

Original Article

DOI: 10.51271/AOR-0002

The effect of cataract surgery on quality of life and sleep in geriatric patient group

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Received: 05/01/2024 ◆ **Accepted**: 25/01/2024 ◆ **Published**: 29.01.2024

Cite this article: Sariyeva Ismayilov A, Sariyeva Aydamirov A, Göktaş E. The effect of cataract surgery on quality of life and sleep in geriatric patient group. *Arch Ophthalmol Res.* 2024;1(1):5-9.

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ABSTRACT

Aims: Investigation of the effects of cataract surgery on quality of life and sleep in geriatric patient group.

Methods: Ninety four patients who were diagnosed with cataract and operated were included. Preoperative and postoperative best corrected visual acuity (BCVA) was measured with the Snellen chart. Cataract types were divided into 3 categories as nuclear, cortical and posterior subcapsular. The VFQ-25 (vision-related quality of life) questionnaire and the Pittsburgh Sleep Quality Questionnaire were administered to the patients before and after the surgery.

Results: One hundred thirty-eight eyes of 94 patients were operated. 45.7% of the patients had nuclear, 16% had cortical, 38.3% had posterior subcapsular cataracts. VFQ 25 questionnaire scores increased from 70.70±3.46 (42-89) to 85.65±7.09 (70-97) postoperatively (p<0.001). While the preoperative Pittsburgh sleep quality index (PSQI) score of the patients was 8.70±2.99 (2-17), it was 6.26±3.19 (1-17) postoperatively (p<0.001). There was a positive correlation between the increase in postoperative visual acuity (Δ) and the VFQ 25 questionnaire score increase (Δ) (r=0.891, p=0.000). ΔVFQ 25 and Δ PSQI values were higher in patients who underwent bilateral cataract surgery, but this difference was not statistically significant (p=0.199, p=0.808). ΔVFQ 25 after posterior subcapsular cataract surgery was greater than nuclear and cortical type. Δ PSQI values were similar in nuclear, posterior subcapsular and cortical cataracts.

Conclusion: Geriatric patients with posterior subcapsular cataracts had a higher postoperative vision-dependent quality of life than patients with other cataract types. Cataract surgery has positive effects on sleep quality of geriatric patients, regardless of cataract type and laterality (bilateral/unilateral).

Keywords: Life quality, sleep quality, cataract surgery, VFQ 25, Pittsburgh sleep quality index

INTRODUCTION

Cataract is the loss of transparency of the crystalline lens and is the most common reason of preventable blindness in the World.[1] Although the major risk factor for cataract development is age; diabetes, uveitis, trauma, ultraviolet exposure and various drug use (steroid, amiodarone, tamoxifen, etc.) can be counted among other risk factors. The increase in the elderly population in the world has also increased the number of cataract surgery performed.

One of the most important criteria of success in cataract surgery is the increase in visual acuity after surgery, but this is not enough to evaluate the effect of surgery on the quality of life of patients. In the Japanese patient population with a mean age of 81.8 (61-90) years, cataract surgery has been shown to improve cognitive functions.[2] Ishii et al.[3] reported that the cognitive functions of elderly patients improved and their depressive mental findings regressed with the increase in quality of life after cataract surgery. Knudtson et al.[4] also reported that the decrease in visual function, regardless of the cause, is associated with decreased quality of life.

A component of a healthy life is healthy sleep. Blue light (short wavelength light) is the strongest stimulus that keeps the circadian rhythm synchronized. It is thought that the concentration in the crystalline lens prevents light from reaching the eye and disrupts the circadian rhythm. Therefore, cataract surgery may have positive effects on the circadian rhythm.[5,6]

In this study, the effect of cataract surgery on quality of life in geriatric patients was evaluated with the Turkish translation of the VFQ 25 questionnaire, and the effect on sleep quality was evaluated with the Pittsburgh Sleep Quality Index (PSQI) questionnaire at least 1 month after surgery. The relationship of the changes with the laterality of the cataract, the type of the cataract and the increase in visual level were examined.

METHODS

The study was carried out in accordance with the Helsinki Declaration approval was obtained from the Bursa Yüksek İhtisas Training and Research Hospital Local Ethics Committee (Date: 27.07.2022, Decision No: 2011-KAEK-25 2022/07-03) and informed consent was obtained from participants.

Ninety four patients who were diagnosed with cataract and operated on between 1 August 2022 and 1 December 2022 were included in the study. The study is a prospective and cross-sectional survey study. Patients with diabetic retinopathy, glaucoma, macular degeneration, patients undergoing retinal surgery and refractive surgery, patients with dry eyes, those with serious systemic diseases that impair their quality of life and sleep (cancer, rheumatic disease, chronic kidney failure, hypertension, etc.), during surgery, patients who developed complications but did not improve their visual acuity, mixed type cataracts (corticonuclear, etc.), and those with different types of cataracts in both eyes (for example: nuclear cataract in one eye, posterior subcapsular in other, etc.) were excluded from the study. Phacoemulsification surgery was performed by a single surgeon. A single type of intraocular lens (hydrophilic-acrylic) was implanted to the patients.

A detailed eye examination was done before cataract the surgery. Preoperative and postoperative best corrected visual acuity (BCVA) was measured with the Snellen chart. Dilated fundus examination was done. Intraocular pressures were determined by applanation tonometry. Cataract types were divided into 3 categories as nuclear, cortical and posterior subcapsular by biomicroscopic examination. Demographic data and comorbidities of the patients were recorded.

The NEI-VFQ (National Eye Institute Visual Function Questionnaire 25 (VFQ-25-vision related quality of life) and the PSQI questionnaire were applied preoperatively and at least 1 month after the operation.

In the VFQ 25 questionnaire, Toprak et al.[7] translated into Turkish was used. The areas of this test are listed as follows; common health, common vision, eye pain, near vision, farsightedness, visual and mental health, visual social interaction, vision related role difficulties, visual dependency, peripheral vision, driving and color vision.

The PSQI questionnaire is a 19-title questionnaire that evaluates sleep quality and disturbance. 18 questions consist of 7 components: sleep quality, latency, duration, habitual sleep efficiency, sleep disturbance, use of sleeping pills, and daytime dysfunction. Each component is scored between 0-3 points and the total score is between 0-21. If the total score is above 5, this indicates worse sleep quality. It was adapted into Turkish by Agargun et al.[8]

Statistical Analysis

Continuous variables were presented as mean±standard deviation and median [min-max] values. Categorical variables were given as n (%). Data normality was confirmed using the Shapiro-Wilk test. Paired-sample t-test was used in dependent groups. The correlation between the variables was analyzed by Spearman analysis. Mann-Whitney-U was used to compare cataract laterality and changes and Kruskal Wallis was used to compare cataract types and changes in VFQ-25 and PSQI, with post-hoc paired Tamhane's T2 test. SPSS (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0.Armonk, NY: IBM Corp.) software was used for statistical analysis and a p value of <0.05 was considered statistically significant.

RESULTS

Fifty three % (n=50) of the patients were female. The mean age was 69.98±5.44 (67-86) years. 45.7% (n=43) of the patients had nuclear, 16% (n=15) had cortical, 38.3% (n=36) had posterior subcapsular cataracts. 138 eyes of 94 patients were operated. The mean BCVA before surgery was 0.14±0.08 (0.01-0.6) according to the Snellen chart, and 0.61±0.15 (0.4-1) postoperatively (Table 1).

Table 1. Demographic data and general characteristics of the participants

	n=94
Mean age (years)	69.98±5.44 (67-86)
Female/Male	50 (53%)/44 (47%)
Type of cataract (NC/CC/PSCC)	43/15/36
Laterality of cataract (unilateral/bilateral)	50/44
Mean preoperative BCVA	0.14±0.08 (0.01-0.6)
Mean postoperative BCVA	0.61±0.15 (0.4-1)

NC: Nuclear cataract, CC: Cortical cataract, PSCC: Posterior subcapsular cataract, BCVA: Best corrected visual acuity; mean±standard deviation (range)

Preoperative BCVA was 0.13±0.06 (0.01-0.3) in nuclear cataract eyes, 0.11±0.06 (0.01-0.3) in cortical cataract eyes, 0.16±1.11 (0.05-0.6) in posterior subcapsular cataract eyes (p=0.194). Postoperative BCVA was 0.60±0.13 (0.4-1.0) in nuclear cataract eyes, 0.63±0.16 (0.4-1.0) in cortical cataract eyes, 0.62±0.16 (0.5-1.0) in posterior subcapsular cataract eyes (p=0.751). Postoperative visual acuity improvement was 0.46±0.13 (0.2-0.8) in nuclear cataract eyes, 0.51±0.13 (0.3-0.8) in cortical cataract eyes, and 0.44±0.16 (0.1-0.8) in posterior subcapsular cataract eyes. There was no significant difference between the groups in terms of visual acuity improvement (p=0.324).

The mean age was 71.14±6.45 (65-86) in nuclear cataract patients, 67.87±3.66 (65-74) in cortical cataract patients, 69.47±4.42 (60-79) in posterior subcapsular cataract patients (p=0.103). There were 27 (62.7%) female in nuclear cataract group, 10 (66.6%) female in cortical cataract group, 13 (36.1%) female in posterior subcapsular cataract group (p=0.054).

When the VFQ 25 questionnaire scores before and after cataract surgery were compared, it was seen that the preoperative total score of 70.70±3.46 (42-89) increased to 85.65±7.09 (70-97) postoperatively (p<0.001). General health (p<0.001), general vision (p<0.001), distance vision (p<0.001), well-being-distress-dependence (p=0.041), driving (p<0.001), color vision (p<0.001) and peripheral vision (p<0.001) score increases were statistically significant; difficulties in activities (p=0.335), near vision (p=0.065) and role restriction (p=0.053) score increases were not statistically significant (Table 2).

While the preoperative PSQI score of the patients was 8.70±2.99 (2-17), it was 6.26±3.19 (1-17) postoperatively (p<0.001). In addition, the difference between sleep quality, sleep duration, sleep latency, habitual sleep efficiency and sleep disturbances scores was statistically significant (Table 3).

Table 2. Comparison of VFQ 25 questionnaire scores before and after surgery

Preoperative total score Postoperative total score	70.70±3.46 (42-89) 85.65±7.09 (70-97)	p<0.001
Preoperative general health Postoperative general health	62.85±16.06 (20-80) 73.70±12.07 (45-90)	p<0.001
Preoperative general vision Postoperative general vision	40.17±15.78 (30-55) 70.18±18.28 (55-88)	p<0.001
Preoperative activity difficulties Postoperative activity difficulties	74.34±11.99 (64-88) 89.33±17.15 (75-100)	p=0.335
Preoperative near vision Postoperative near vision	73.13±1.82 (70-76) 76.89±2.18 (72-80)	p=0.065
Preoperative distance vision Postoperative distance vision	65.25±12.68 (51-75) 90.51±17.57 (87-100)	p=0.001
Preoperative role restriction Postoperative role restriction	72.05±13.82 (60-87) 76.62±9.63 (65-86)	p=0.053
Preoperative well-being-distress-dependence Postoperative well-being-distress-addiction	89.85±10.46 (78-100) 91.98±15.17 (80-100)	p=0.041
Preoperative driving Postoperative driving	71.78±15.25 (50-79) 93.34±10.98 (83-100)	p<0.001
Preoperative color vision Postoperative color vision	82.67±17.58 (78-94) 96.12±5.87 (90-100)	p<0.001
Preoperative peripheral vision Postoperative peripheral vision	80.89±11.48 (70-93) 98.12±3.17 (95-100)	p<0.001

Paired simple t-test, p<0.05 significant

Table 3. Pittsburgh sleep quality index (PSQI) scores before and after surgery

Preoperative PSQI score Postoperative PSQI score	8.70±2.99 (2-17) 6.26±3.19 (1-17)	p<0.001
Preoperative sleep quality Postoperative sleep quality	1.83±0.54 (0-3) 1.20±0.59 (0-3)	p<0.001
Preoperative sleep latency Postoperative sleep latency	1.76±0.86 (0-6) 1.20±1.04 (0-4)	p<0.001
Preoperative sleep duration Postoperative sleep duration	1.68±0.76 (0-3) 1.06± 0.81 (0-3)	p<0.001
Preoperative habitual sleep efficiency Postoperative habitual sleep activity	1.72±0.55 (0-3) 1.21±0.50 (0-2)	p<0.001
Preoperative sleep disorder Postoperative sleep disorder	0.88±0.73 (0-2) 0.82±0.70 (0-2)	p=0.033
Preoperative use of sleeping pills Postoperative use of sleeping pills	0.07±0.25 (0-1) 0.09±0.28 (0-1)	p=0.323
Preoperative diary dysfunction Postoperative diary dysfunction	0.74±0.64 (0-2) 0.70±0.59 (0-2)	p=0.323

PSQI: Pittsburgh sleep quality index; paired simple t-test, p<0.05 significant

While there was a positive correlation between postoperative visual acuity improvement (Δ) and VFQ 25 questionnaire score increase (Δ) (r=0.891, p=0.000); There was no correlation between decrease in PSQI score (Δ) (r=0.019, p=0.853) (Table 4). No correlation was found between Δ VFQ 25 and Δ PSQI (r=-0.045, p=0.664).

Table 4. Correlation between increase in visual acuity (Δ) and postoperative VFQ 25 score (Δ) and decrease in Pittsburgh Sleep Quality Index (PSQI) score (Δ)

		Δ VFQ 25	Δ PSQI
Δ Visual Acuity	r p	0.891 0.000	0.019 0.853

Δ Visual Acuity: improvement in postoperative visual acuity, Δ VFQ 25: change in postoperative VFQ 25, Δ PSQI: change (decrease) in postoperative Pittsburgh Sleep Quality Index score, analyzed by the Spearman test.

Δ VFQ 25 and Δ PSQI values in patients who underwent bilateral cataract surgery were higher than in patients who underwent unilateral surgery, but this difference was not statistically significant (p=0.199 and p=0.808) (Table 5). Δ VFQ 25 after posterior subcapsular cataract surgery was greater than nuclear and cortical type. Δ PSQI values were similar in nuclear, posterior subcapsular, and cortical cataracts (Table 6).

Table 5. The relationship between Δ VFQ 25 and Δ PSQI in patients who underwent unilateral and bilateral cataract surgery

	Δ VFQ 25	p value	Δ PSQI	p value
Unilateral cataract Bilateral cataract	14±7.30 16.03±6.99	0.199	2.53±1.88 2.64±2.19	0.808

Δ VFQ 2: change in postoperative VFQ 25, Δ PSQI: change in postoperative Pittsburgh Sleep Quality Index score, Mann Whithey-U test performed.

Table 6. Relationship between cataract type and Δ VFQ 25 and Δ PSQI

	Δ VFQ 25	Δ PSQI
Nuclear cataract	12.90± 6.61	2.72±2.36
Posterior subcapsular cataract	19.19± 6.33*	2.53±1.89
Cortical cataract	13.33± 6.66	2.47± 1.80

*p<0.000 posterior subcapsular cataract compared with nuclear cataract; p=0.001 posterior subcapsular cataract compared with cortical cataract p=0.023 (post hoc Tamhane T2 test); Δ VFQ 25: change in postoperative VFQ 25, Δ PSQI: change in postoperative Pittsburgh Sleep Quality Index score

DISCUSSION

Cataract surgery is among the most frequently performed surgeries in the world with the increase in the elderly population. Since mobilization, postoperative care and wound healing of patients are difficult in advanced ages, cataract surgeries can be postponed by both patient relatives and physicians considering the patient's benefit. In this study, we investigated the effects of cataract surgery performed in the geriatric patient group on the quality of life and sleep of the patients.

According to the VFQ 25 survey results we applied, the patients' general health, general vision, distance vision, well-being-distress-addiction, driving, color vision and peripheral vision scores increased significantly after cataract surgery. Gray et al.[9] showed that consecutive cataract surgery on both eyes resulted in significant improvement in the visual and general health of the patients. Makabe et al.[10] reported that the vision-dependent quality of life score increased significantly in both patient groups who had unilateral and bilateral cataract surgery. While there are studies showing that cataract surgery increases the postural stability and mobility of elderly patients,[11] there are also studies reporting that it reduces the risk of falling.[12] Yotsukura et al.[13] determined that patients with cataract had lower subjective happiness scores and showed that cataract surgery for posterior subcapsular cataract and improved postoperative sleep quality were associated with postsurgical satisfaction. Also, Ishii et al.[3] reported depressive symptoms and cognitive status in patients and found a correlation between NEI-VFQ 25 scores and both Mini Mental State Examination and Beck depression test before and after surgery.

Photosensitive retinal ganglion cells are very important in the formation of the circadian rhythm. These cells are particularly sensitive to short wavelength light (blue light-480 nm).[14] The place where the light stimulates after the ganglion cells is the suprachiasmatic nucleus. The cataract creates a concentration in the pupillary gap, preventing the passage of light to the suprachiasmatic nucleus. Cataract surgery can remove this obstacle and make positive contributions to the circadian rhythm.[15] In the study of Ayaki et al.[16] reported that sleep quality after cataract surgery increased after the 2nd postoperative month and found that the increase in postoperative VFQ-25 was correlated with the decrease in PSQI. Shenshen et al.[17] reported that PSQI and ESS scores decreased significantly in the 1st month after cataract surgery, and melatonin release at 23.0 hours increased

significantly. Alexander et al.[18] reported that cataract surgery significantly improved sleep quality one month after surgery. However, in another longitudinal, population-based study, it was suggested that cataract extraction did not have a significant effect on sleep quality.[19] In this study, the scores of the patients in the post-operative PSQI general score, sleep quality, sleep duration, sleep latency, habitual sleep efficiency and sleep disorders were statistically significantly decreased. But there was no correlation between decrease in PSQI score and visual acuity improvement. Cataract surgery may have improved sleep quality in our patients by affecting the circadian rhythm.

Patients with posterior subcapsular cataracts had a higher postoperative VFQ 25 increase than patients with nuclear and cortical cataracts. Posterior subcapsular cataract occurs most frequently in the optic axis and impairs contrast sensitivity and close vision more than other types of cataracts and causes glare.[20] Non-dense posterior subcapsular cataracts can be very uncomfortable for patients. For this reason, the quality of life score due to vision may have increased more than other types of cataract, probably because these symptoms of patients disappeared after cataract surgery.

Kokune et al.[21] reported that surgical removal of the posterior subcapsular cataract affects sleep quality better than other types of cataracts. There is also a different study emphasizing that nuclear cataract is the type of cataract that most impairs sleep quality by preventing blue light transmission due to the urochrome in its structure.[22] However, the decrease in PSQI scores was similar in all three cataract types (nuclear-cortical-posteriorsubcapsular) in our study. Again in this study, there was a correlation between the increase in visual acuity and the increase in the quality of life score, but there was no correlation between the decrease in the sleep quality score.

Limitations

Limitations of the study; objective measurements were not made for contrast sensitivity, visual field and depth sense, which are the other components of vision other than visual acuity. Polysomnography is the gold standard and has objective results in investigating sleep quality. Polysomnography could not be performed on the patients. Data from larger patient groups are needed to generalize the results to the general population.

CONCLUSION

Cataract surgeries can be delayed because mobilization, postoperative care and wound healing of patients are difficult in advanced ages. However, increased visual acuity is not the only benefit of this surgery applied to the geriatric population. Applied cataract surgery may have positive effects on both the quality of life of geriatric patients and the quality of sleep regardless of cataract type and laterality (bilateral/unilateral).

ETHICAL DECLARATIONS

Ethics Committee Approval

The study was carried out with the permission of Bursa Yüksek İhtisas Training and Research Hospital Local Ethics Committee (Date: 27.07.2022, Decision No: 2011-KAEK-25 2022/07-03).

Informed Consent

All patients signed and free and informed consent form.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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