

# Vision-Related Quality of Life in Patients Suffering from Coexisting Glaucoma and Cataract

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## Research Article

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# Abstract

## Purpose

To evaluate the QOL and vision-related QOL in patients suffering from coexisting glaucoma and cataract.

## Methods

This cross-sectional-analytical study was carried out on 222 cases including 163 patients suffering from coexisting glaucoma and cataract as patients' group and 59 healthy individuals as the control group. Data were gathered via the use of EuroQol five-dimensional (EQ-5D) and National Eye Institute-Visual Functioning Questionnaire 39 (NEI-VFQ 39). Then, the obtained results were compared before and one month after cataract surgery in patients and control groups.

## Results

The mean and 95% confidence interval of overall vision-related QOL score in healthy individuals and patients during pre- and post-operation phases were 86.65 (69.3 – 104.0), 48.7 (9.4 – 88.1) and 56.1 (12.2 – 100.0), respectively. There were significant differences among the three compared groups in terms of all NEI-VFQ 39 items ( $P < 0.05$ ). The mean and confidence interval of EQ-5D score during pre- and post-operation phases were 0.42 (0.21-0.64) and 0.58 (0.39-0.78), respectively ( $P = 0.017$ ) and for healthy individuals, it was 0.70 (0.59-0.80). After surgery, all QOL items significantly increased among patients ( $P < 0.05$ ). Also, there were significant differences in the scores compared to healthy individuals ( $P < 0.05$ ). One month after surgery, all vision-related QOL items scores obtained by EQ-5D were significantly lower in the treated patients than healthy individuals ( $P < 0.05$ ).

## Conclusion

In patients suffering from coexisting glaucoma and cataract, the overall QOL and vision-related QOL scores were improved after cataract surgery. However, there was a significant difference between them and healthy individuals.

## Introduction

The World Health Organization (WHO) states that "health is not the absence of disease in the individual, but complete physical, mental and social health that is health" so the impact of a disease or treatment measured by assessment of the quality of life (QOL) in addition to traditional clinical procedures. (1) Indeed, quality of life measurements are now a standard part of clinical trials of health interventions. Eye abnormalities are inevitable in human life. (2) Of these abnormalities, cataracts which is an opacity of the crystalline lenses that reduce vision due to impaired light transmission, (3) and glaucoma, which is a group of ocular disorders leading to progressive damage to the retinal nerve fiber layer (RNFL) can be mentioned. In glaucoma, progressive RNFL damage usually begins with decreased peripheral vision. (4–6) Studies have shown that glaucoma and cataract reduce visual functions. These put more restrictions on a person's visual function and daily activities, especially in the elderly. One of the treatments available in these patients is cataract surgery. Although improvement of visual functions such as visual acuity and contrast sensitivity occur following cataract surgery, there is limited information in the literature about the impact of cataract surgery on QOL in patients suffering from coexisting glaucoma and cataract.

The QOL questionnaires are a more comprehensive tool for assessing a person's health status and can improve patient-physician interaction. National Eye Institute-Visual Functioning Questionnaire (NEI-VFQ) is one of the most common questionnaires used in glaucoma patients that measured vision-related QOL. (7) This questionnaire can be used in both interview and self-fulfilling formats. The validity and reliability of this questionnaire have been examined and approved by a research team in our country. (8) Therefore, due to the lack of research results in the field of QOL and visual function in a group of patients suffering from coexisting glaucoma and cataracts in comparison to healthy individuals, we conducted a study to examine the QOL of these patients.

## Materials And Methods

This cross-sectional-analytical study was performed in Khatam Al-Anbia hospital in Mashhad, Iran, during 2017-2018. Having explained the objectives of the study, participants' approval was obtained to attend in the study and complete the questionnaire.

This study was done on visually healthy individuals as a control group and patients with glaucoma and cataracts as patients group. According to the data represented in Hatt article (9) with a confidence interval of 95% and a test power of 80%, 163 adult patients participated in this study as a sample group. The first group included 163 patients who were diagnosed with glaucoma and cataracts. The diagnoses were made by an expert glaucoma surgeon. The second group included visually healthy individuals who did not have any ocular, mental and musculoskeletal diseases; and any type of refractive error. This group was selected from the companion of patients group who had recently undergone ophthalmological examinations. The sampling was done randomly. The study was performed in accordance with the tenets of the Declaration of Helsinki and as approved by the ethics committee of Mashhad University of Medical Sciences. The aim of the study was explained to the patients and their parents, and then the consent forms were obtained.

The diagnosis of cataract and glaucoma was performed based on criteria that were reported in previously published articles. (10, 11) The questionnaire was the Persian version NEI-VFQ (EuroQol five-dimensional [EQ-5D] and 39-item visual functioning questionnaire structure [NEI-VFQ 39]). EQ-5D questionnaire measures the ability of individuals to perform tasks in 5 dimensions of mobility, personal care, normal activities (such as working, studying, doing household chores, having family or leisure activities), pain (discomfort) and anxiety (depression). This questionnaire is concise but comprehensive and takes 1 to 5 minutes to be answered depending on the situation. Then each health condition on a scale of 0 to 1 was evaluated. NEI-VFQ 39 QOL is one of the most

common questionnaires to measure the QOL and measures various aspects of life, including general health, visual health, mental health, eye pain, distance & near vision activities, social performance, peripheral vision, color vision, limitation of doing an activity, driving, and dependency. According to the questionnaire instruction, each question's answer was converted into a score between 0 and 100, in which 0 indicates the worst and 100 the best score and performance. (12)

These questionnaires have been translated into the Persian language and their validity and reliability have been confirmed. (8, 9, 13) However, the questionnaires' reliability (EQ-5D and NEI-VFQ 39) was evaluated using Cronbach's alpha test at a confidence level of 0.95 in SPSS software.

The interview format of the questionnaire was used to determine the QOL score. In addition to completing the questionnaire, demographic information affecting the QOL of patients (including age, sex and education) was also obtained. Finally, the QOL score of patients suffering from glaucoma with cataracts during pre and post-operation phases in comparison to healthy individuals was assessed, and the factors affecting the QOL score were evaluated.

SPSS-24 (IBM Corp, Armonk, New York, USA) software was used for data analysis. For evaluating the normality of the data, which is a prerequisite of using analysis of variance, the Kolmogorov-Smirnov test was used. For showing the QOL data the mean with confidence interval and for investigating and evaluating the difference in the QOL during pre and post-operation phases, one-way analysis of variance was used at a confidence level of 0.95. P-value less than 0.05 was considered as significant level. Cronbach's alpha test was used to examine the validity of the questionnaire used according to their main variables.

## Results

The mean age of 163 patients suffering from glaucoma and cataracts and 59 healthy individuals were  $43.7 \pm 9.27$  and  $36.8 \pm 10.35$ , respectively. Of the patients' group, 100 (61.3 %) were male and 63 (38.7%) were female. On the other hand, 38(65.4%) of healthy individuals were male and 21(35.6%) were female. Table1 shows the demographic characteristics between the two study groups. As shown in this table, in the control and patients' group, 44(74.5%) and 125(76.2%) individuals were undergraduates, respectively.

Table 1  
Demographic characteristics in patients and control groups.

Parameter		Control group Number (%)	Patients group Number (%)	P-Value
Gender	Male	37 (63%)	99 (61%)	0.002
	Female	22 (37%)	64 (39%)	
Education	Illiterate	4 (7%)	15 (9%)	0.3
	Primary school	6 (10%)	21 (13%)	
	Secondary school	10 (17%)	23 (14%)	
	Diploma	24 (41%)	65 (40%)	
	University graduated	15 (25%)	39 (24%)	
Occupation	Employee	20 (34%)	62 (38%)	0.02
	Self employed	22 (37%)	48 (29%)	
	Others	17 (29%)	53 (33%)	
Visual outcomes	CDVAa	0.05±0.05	0.23±0.14	0.04
	UDVAb	0.05±0.1	0.25±1.5	0.03
	Spherical Equivalent	-0.25±0.75	-2.02 ±0.5	0.001
a ; Corrected Distance Visual Acuity				
b : Uncorrected Distance Visual Acuity				

Table 2 represents the characteristics of descriptive statistics related to QOL items of 163 patients during pre and post-operation phases compared to 59 healthy individuals. The mean and confidence interval of overall NEI-VFQ 39 score in pre and post-operation phases in patients and healthy individuals were 48.7(9.4-88.1), 56.1(12.2-100.0) and 86.65(69.3-104.0), respectively ( $P < 0.05$ ). The mean and confidence interval of EQ-5D score for patients during the pre and post-operation phase was 0.42 (0.21-0.64) and 0.58 (0.39-0.78), respectively ( $P = 0.017$ ) and for healthy individuals, it was 0.70(0.59-0.80).

**Table 2.** Vision-related QOL obtained by NEI-VFQ 39 and EQ-5D questionnaire among patients suffering from glaucoma with cataracts and healthy individuals.

Questionnaire	Variables (number of questions)	Mean( $\pm$ SD)		
		Patients group		Healthy group
		Pre operation	Post operation	
NEI-VFQ 39 <sup>a</sup>	General health (2)	59(4.83)	70(1.4)	84.62(2.6)
	General vision (2)	43.9(5.24)	55.4(3.2)	87.53(2.25)
	Ocular pain (2)	79.36(3.92)	95.87(2.6)	96.79(1.26)
	Near activities (6)	51.45(7.2)	63.21(1.2)	95.9(1.26)
	Distance activities (6)	59.83(6.29)	74.76(3.5)	98(0.79)
	Vision-specific social functioning (3)	66.11(5.76)	80.11(0.9)	100(00)
	Vision-specific mental health (5)	51.63(6.9)	61.87(0.69)	95.84(1.26)
	Vision-specific role difficulties (4)	59.65(7.91)	73.2(4.3)	94.9(1.44)
	Vision-specific dependency (4)	62.72(8.16)	78.5(4.7)	98.89(0.34)
	Driving (3)	50.97(8.36)	61.8(2.9)	91(1.8)
	Color vision (1)	83.19(4.49)	88.2(1.5)	97(1.57)
	Peripheral vision (1)	62.09(6.54)	75.12(4.9)	99(0.83)
	Composite score (39)	62.96	73.41(3.2)	95(0.72)
EQ-5D <sup>b</sup>	Quality of Life	0.42(0.21-0.64)	0.58(0.39-0.78)	0.70(0.59-0.80)

a : National Eye Institute-Visual Functioning Questionnaire

b : EuroQol five-dimensional

Table 2 shows the overall QOL score and vision-related QOL and its components of patients during pre-operation and post-operation phases and healthy individuals. In pre and post-operation, the lowest scores among patients were observed in general vision (43.9 and 55.4, respectively) and the highest scores were found in color vision item (83.19 and 88.21, respectively).

The results of Cronbach's alpha test in EQ-5D and NEI-VFQ were 0.79 and 0.77, respectively. According to these results, in both questionnaires, Cronbach's alpha is higher than 0.7, which indicates that the questionnaires have reliability.

Based on the Scheffe posthoc test results which are represented in Table 3, three comparisons have been made. In the first comparison, the QOL items among patients suffering from glaucoma with cataracts (during the pre-operation phase) and healthy individuals has been examined. In the second comparison, the vision-related QOL items during the pre and post-operation of glaucoma with cataracts phase were examined. Finally, in the third comparison, vision-related QOL items among patients suffering from glaucoma with cataracts during post-operation phase in comparison to healthy individuals were examined. As it can be noticed, the results of variance analysis showed that the difference between QOL items of these three groups was different. As it can be seen in Table 3, all vision-related QOL items among three compared groups (pre-operation phase, post-operation phase and healthy individuals) were significantly different in all items. The results showed that all vision-related QOL items in the pre-operation was significantly lower than both post-operation and healthy individuals ( $P < 0.05$ ). However, the second comparison between the QOL items scores among post-operation phase was significantly lower than healthy individuals ( $P < 0.05$ ).

Table 3

The statistically difference (P- value) between patients suffering from glaucoma and cataracts (before and one month after cataract surgery) and healthy

National Eye Institute-Visual Functioning Questionnaire 39												
	General vision	Ocular pain	Near activities	Distance activities	Vision-specific social functioning	Vision-specific mental health	Vision-specific role difficulties	Vision-specific dependency	Driving	Color vision	Peripheral vision	Compo score
Patient group(pre operation) vs Healthy group	0.002	0.041	0.001	0.005	0.03	0.001	0.011	0.047	0.049	0.004	0.03	0.039
Patient group(pre operation) vs Patient group(post operation)	0.033	0.012	0.001	0.001	0.007	0.028	0.01	0.007	0.001	0.036	0.028	0.044
Patient group(post operation) vs Healthy group	0.02	0.001	0.015	0.03	0.017	0.008	0.001	0.004	0.019	0.021	0.048	0.04

## Discussion

This study was done to evaluate the QOL and visual performance of patients suffering from glaucoma with cataract during pre and post-operation phase. According to the results of this research, although the overall QOL score and vision-related QOL score in glaucoma patients with cataract were improved after cataract surgery, there was a significant difference between postoperative patients' results and healthy individuals. Based on the results of this study, the total score of QOL VFQ 39 of patients during pre and post operation phase were 48.7 and 56.1 respectively, and the in the healthy individuals was 86.65. There was a significant difference between the mean QOL VFQ 39 scores of patients during the pre and post-operation phases. The same as our results, other studies have shown a significant improvement in the QOL VFQ scores observed after eye surgery. However, most of them have been conducted in different eye surgeries with different races and social factors. (6, 9, 14–21) The mean EQ-5D score of patients during pre and post-operation phases were 0.42 and 0.58, respectively, which shows the significant difference between pre and post-operation. In this study, the QOL score was lower than in previous studies. (17–19, 22–25) The main reason for this difference would be the effect of economic, social and race on QOL scores. Also, in this study, the sample size was larger than in other mentioned studies.

A previous study has shown that the vision-related QOL has been increased following cataract surgery. In addition, increasing glaucoma severity had a negative impact on vision-related QOL. (6) However, other researchers have not evaluated the QOL and visual performance of patients suffering from glaucoma with cataract.

In this study, the QOL was evaluated in 12 main subgroups with a total score. The results indicate a significant difference between patients and healthy individuals during the post-operation phase in all subgroups. Some studies were in line with this study's results and confirmed the correlation between QOL and visual performance in different eye diseases. (14, 26–28)

In another study, education was significantly correlated to overall QOL and vision-related QOL. (14) Due to the better awareness of patients with higher education about the necessity of operation, QOL in these patients was higher than lower educated ones, which was in line with a previous study. (18) In examining QOL factors, including psychosocial perspective, the cognitive environment among patients based on their education status can indicate that higher educated patients had better QOL compared to lower educator ones. The correlation of age with these variables was inverse which means as age increases, the score of QOL decreases. (29)

Of the difference-making factors, inclusion criteria, severity and type of disease, participants' mean age, random sampling, and individual and social factors can be mentioned. Generally, it can be concluded that glaucoma with cataracts affects not only the physical but also the psychosocial aspect; and by the reduction of vision and increasing stress, it can have a negative effect on individual-social relations of patients.

In summary, although the cataract surgery of patients suffering from glaucoma with cataracts significantly increased the QOL and vision-related QOL items, these items after cataract surgery was significantly lower than healthy individuals.

## Declarations

### Ethics approval and consent to participate

The research protocol was in accordance with the Helsinki's Declaration and approved by the Ethics Committee in Human Research at Mashhad University of Medical Sciences, Mashhad, Iran (IR.MUMS.REC.1397.240).

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## Availability of data and materials

The datasets generated and/or analyzed during the current study are not publicly available since all relevant data are included in the manuscript. The datasets are available from the corresponding author on reasonable request.

## Competing interests

The authors declare that they have no competing interests.

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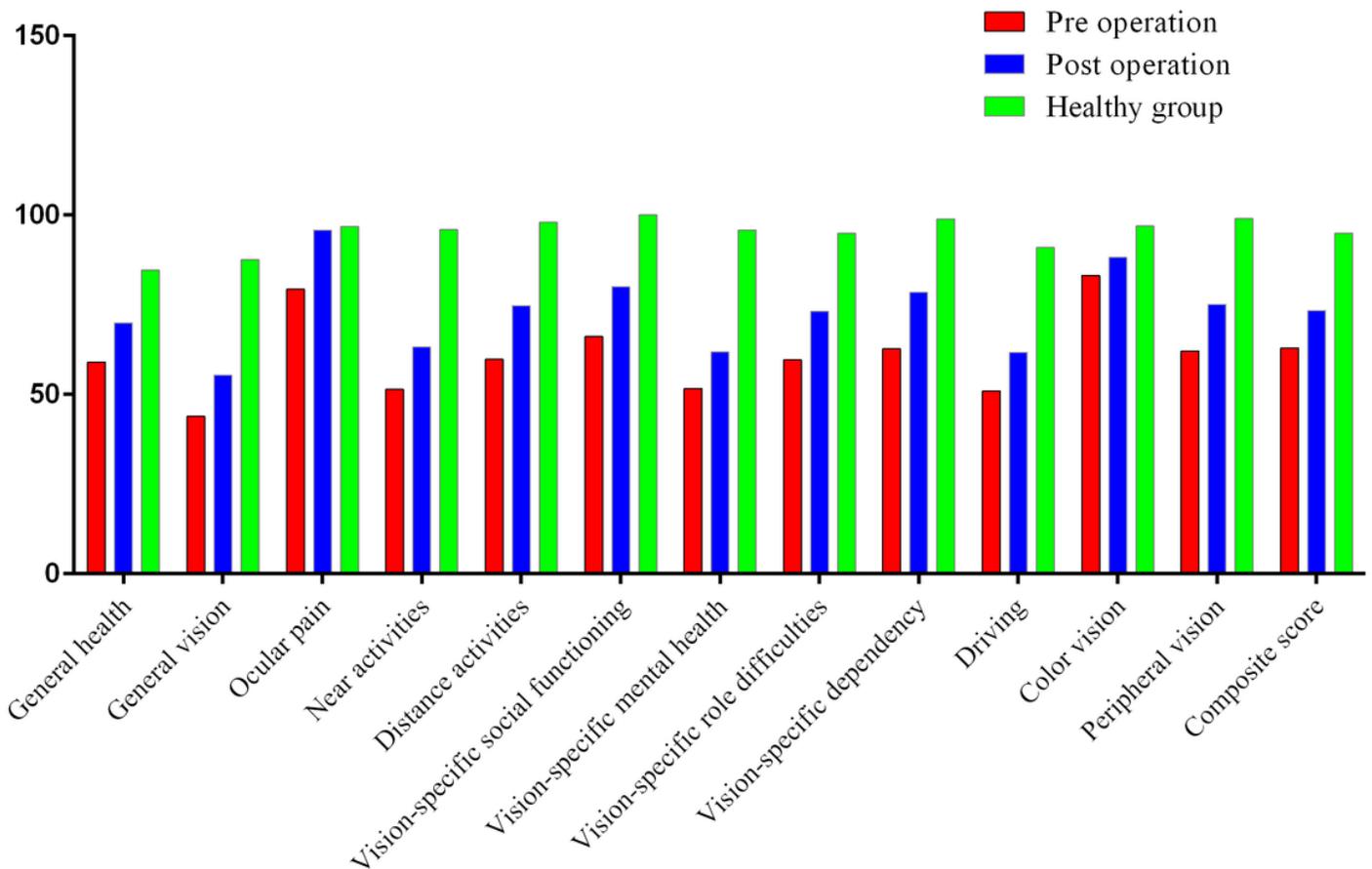
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## Figures



**Figure 1**

Vision-related QOL obtained by NEI-VFQ 39 questionnaire among patients suffering from glaucoma with cataracts and healthy individuals.