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The Relationship Between Quality of Life Questionnaires and Retinal Nerve Fiber Thickness: A Cross-Sectional Study

Yaşam Kalitesi Anketi ile Retina Sinir Lifi Kalınlığı Arasındaki İlişki: Kesitsel Araştırma

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ABSTRACT Objective: The purpose of this study was to determine the association between vision-related quality of life (QoL) and retinal nerve fiber layer (RNFL) loss. **Material and Methods:** This cross-sectional study included 92 patients diagnosed with primary open angle glaucoma. Visual acuity (VA), visual field (VF) and RNFL were assessed. The patients were divided into 3 groups according to the glaucoma damage in the VF as mild, moderate and severe. Patient-reported QoL was determined using the Glaucoma Quality of Life-15 (GQL-15) and the 25-item National Eye Institute Visual Function Questionnaire (NEI VFQ-25). **Results:** The mean age of the patients was 61.38±12.58 years and the mean duration of glaucoma was 7.91±4.74 years. There was no statistically significant difference between the groups in terms of age, gender and diagnosis time. Patients with Stage 3 glaucoma had thinner RNFL in the better eye and worse VA in the better and worse eyes compared to patients with Stage 1 glaucoma. There were significant differences in terms of GQL-15 and NEI VFQ-25 scores between the mild and severe patients. The thickness of the RNFL differed significantly between the 3 groups. Correlation analysis revealed that the general health, general vision, mental health and peripheral vision subdomains of the NEI VFQ-25 were moderately correlated with RNFL thickness. The total and subdomain scores of the GQL-15 were not correlated with RNFL thickness. **Conclusion:** In patients with glaucoma, RNFL thickness loss is associated with NEI VFQ-25 scoring, but not with GQL-15 scores.

Keywords: Glaucoma; National Eye Institute Visual Function Questionnaire-25; Glaucoma Quality of Life-15; retinal nerve fiber layer

ÖZET Amaç: Bu çalışmanın amacı, görme ile ilişkili yaşam kalitesi [quality of life (QoL)] anketi ile retina sinir lifi tabakası (RSLT) kaybı arasındaki ilişkiyi belirlemektir. **Gereç ve Yöntemler:** Bu kesitsel çalışmaya primer açık açılı glokom tanısı konan 92 hasta dâhil edildi. Görme keskinliği, görme alanı ve RSLT değerlendirildi. Hastalar görme alanındaki glokom hasarına göre hafif, orta ve şiddetli olarak 3 gruba ayrıldı. Hasta tarafından bildirilen QoL, Glokom Yaşam Kalitesi-15 [Glaucoma Quality of Life-15 (GQL-15)] ve 25 maddelik Ulusal Göz Enstitüsü Görsel İşlev Anketi [National Eye Institute Visual Function Questionnaire (NEI VFQ-25)] ile belirlendi. **Bulgular:** Ortalama yaş 61,38±12,58 ve ortalama glokom süresi 7,91±4,74 yıldı. Gruplar arasında yaş, cinsiyet ve tanı süresi açısından istatistiksel olarak anlamlı fark yoktu. Evre 3 glokomlu hastalar, Evre 1 glokomlu hastalara kıyasla daha iyi gözde daha ince RSLT'ye, daha iyi ve daha kötü gözlerde daha kötü görme keskinliğine sahipti. Hafif ve şiddetli hastalar arasında GQL-15 ve NEI VFQ-25 skorları açısından anlamlı fark vardı. RSLT'nin kalınlığı 3 grup arasında önemli ölçüde farklılık gösterdi. Korelasyon analizi, NEI VFQ-25'in genel sağlık, genel görme, zihinsel sağlık ve periferik görme alt alanlarının RSLT kalınlığı ile orta derecede ilişkili olduğunu ortaya koydu. GQL-15'in toplam ve alt alan puanları RSLT kalınlığı ile korele değildi. **Sonuç:** Glokomlu hastalarda RSLT kalınlık kaybı NEI VFQ-25 skorlaması ile ilişkili iken, GQL-15 skorları ile ilişkili değildir.

Anahtar Kelimeler: Glokom; Ulusal Göz Enstitüsü Görsel İşlev Anketi-25; Glokom Yaşam Kalitesi-15; retina sinir lifi tabakası

Glaucoma is a chronic optic neuropathy that results in irreversible visual field (VF) loss and is a neurodegenerative disease. It is one of the leading causes of irreversible blindness worldwide. Glaucoma is characterized by vision loss as a result of retinal nerve fiber loss caused by increased pressure on the optic nerve due to increased intraocular pressure (IOP). Primary open angle glaucoma (POAG) is the most

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common form of the disease, which is chronic and progressive in nature, characterized by an open angle of the anterior chamber, optic nerve head changes, and progressive VF loss.[1-4]

The National Eye Institute Visual Function Questionnaire (NEI VFQ-25) is a comprehensive questionnaire that measures various aspects of vision-related quality of life (QoL). It consists of 12 categories, covering general health, vision, daily activities, social functioning, and more. It provides a thorough evaluation of the overall impact of visual impairment on a person's QoL. The Glaucoma Quality of Life-15 (GQL-15) is a concise and user-friendly questionnaire specifically designed for individuals with glaucoma, which was developed in the early 2000s and has been proven to be valid and reliable in several studies. The questionnaire shows strong correlations with VF loss and other important visual function measures. Overall, the GQL-15 is an effective tool for assessing the impact of glaucoma on the QoL of patients.[5,6]

Glaucoma not only leads to visual impairment but also affects QoL, daily activities, and visual function. Previous research has established a correlation between glaucomatous damage and vision-related QoL, often assessed through self-reported outcome measures such as the NEI VFQ-25 and GQL-15 questionnaires. However, the extent to which these questionnaires capture the impact of glaucoma on perceived QoL remains unclear.[7-17]

The aim of this cross-sectional study was to address this gap by examining the relationship between structural glaucomatous damage [measured by retinal nerve fiber layer (RNFL) thickness] and vision-related QoL. Both the NEI VFQ-25 and GQL-15 questionnaires were used to assess QoL, and these were evaluated to determine which questionnaire is more reflective of QoL based on the severity of glaucomatous damage.

MATERIAL AND METHODS

STUDY DESIGN

This cross-sectional study was conducted with patients from Haydarpaşa Numune Training and Research Hospital Department of Ophthalmology Clinic of Glaucoma. Written informed consent was obtained from all patients. The study was approved by the Haydarpaşa Numune Training and Research Hospital Clinical Research Ethics Committee (date: May 16, 2022; no: 2022/KAEK/97) and this research complied with the principles of the Declaration of Helsinki.

PARTICIPANTS

The study included a total of 92 patients diagnosed with POAG without any other eye disease. The glaucoma diagnosis and follow-up of the patients were carried out by the same doctor (AÖK).

All the patients included had been diagnosed with POAG at least six months prior to the study, were aged >18 years, and had cognitive ability to answer the questions.

Exclusion criteria were defined as secondary causes of glaucoma, ocular surgery or laser therapy within 3 months prior to the study, eye disease other than glaucoma causing visual impairment (retinal or optic nerve pathologies), other neurological or musculoskeletal disorders affecting perceived QoL level and activities of daily living, or the presence of refractive defects exceeding a spherical 8 diopter (D) or a cylindrical 3 D, which could affect optical coherence tomography (OCT) RNFL measurements. Patients with cataracts were also excluded from the study as QoL scoring may have been affected.

The glaucoma patients were divided into 3 groups according to the Hodapp, Parrish and Anderson classification (Table 1).[18]

PROCEDURE

All the patients in this study underwent a clinical ophthalmological examination, including best corrected visual acuity (BCVA), slit lamp microscopy, indirect ophthalmoscopy (fundoscopy), and gonioscopy. VF examination was performed using a Humphrey Visual Field Analyzer (Carl Zeiss Meditec, Dublin, CA). Visual acuity (VA) was determined using the Snellen VA chart and the BCVA values were converted into a logarithm of minimum angular resolution. RNFL thickness was measured using spectral-domain OCT (Spectralis; Heidelberg Engineering, Heidelberg, Germany). POAG was defined as eyes with open anterior

TABLE 1: Hodapp, Parrish, and Anderson classification.

Early	• MD<-6 dB
	• Less than 25% of the points (18) are depressed below the 5% level and less than 10 points are depressed below the 1% level on the pattern deviation plot
	• All points in the central 5 must have sensitivity of at least 15 dB
Moderate	• MD -6 to -12 dB
	• Less than 50% of the points (37) are depressed below the 5% level and less than 20 points are depressed below the 1% level on the pattern deviation plot
	• No points in the central 5 can have a sensitivity of 0 dB
	• Only one hemifield may have a point with sensitivity of 15 dB within 5 of fixation.
Severe	• MD>12 dB
	• More than 50% of the points (37) are depressed below the 5% level or more than 20 points are depressed below the 1% level on the pattern deviation plot
	• At least one point in the central 5 has sensitivity of 0 dB
	• Points within the central 5 with sensitivity of 15 dB in both hemifields

MD: Mean deviation.

chamber angles and evidence of glaucomatous optic neuropathy. Clinical and demographic variables were recorded including, age, sex, education level, history of ocular surgery, medication, and systemic diseases.

Vision-related QoL was assessed using the Turkish versions of the NEI VFQ-25 and GQL-15 questionnaires. The NEI VFQ-25 questionnaire consists of 25 items in 12 domains of general vision, general health, mental health, dependency, social function, role difficulties, distance vision, peripheral vision, driving, near vision, color vision, and ocular pain. Each answer has predefined numerical response values. In the scoring of the scale, each subtitle can be coded and transformed to a 0-100 scale in which "0" represents the worst situation, while "100" corresponds to the best situation.[19] The NEI VFQ-25 has been translated and validated into Turkish and is accepted as a reliable and valid tool to assess vision-related functions.[20]

The GQL-15 scale includes 4 domains of central and near vision, peripheral vision, outdoor mobility, and glare and dark adaptation. The responses are scored between 1 (no difficulty) to 5 (severe difficulty) and a lower score indicates good QoL.[14,21]

STATISTICAL ANALYSIS

Data were analyzed using SPPS vn. 25 software (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY, USA). Descriptive statistics were presented as mean±standard deviation for continuous variables and as number (n) and percentage (%) for categorical variables. Conformity of the data to normal distribution was checked with the Shapiro-Wilk test. The 3 different glaucoma stages of mild, moderate and severe were compared using one-way analysis of variance. Pearson correlation analysis was used to analyze possible correlations between the QoL questionnaire scores and objective clinical parameters. Multivariate linear regression analysis was performed to evaluate correlations of VA, RNFL thickness and dependent variables with the GQL-15 and NEI VFQ-25 total scores. A value of $p<0.05$ was considered to be statistically significant.

RESULTS

Evaluation was made of a total of 92 patients with a mean age of 61.38±12.58 years and mean glaucoma duration of 7.91±4.74 years. The demographic and clinical characteristics of the patients are summarized in Table 2.

There were no statistically significant differences in age, gender and diagnosis time between the groups. Patients with Stage 3 glaucoma had thinner RNFL in the better eye, and worse VA in both the better and worse eyes compared to patients with Stage 1 glaucoma. No differences were detected between patients with Stage 2 and Stage 3 glaucoma in terms of VA in the worse and better eyes and RNFL thickness in the better eye. RNFL thickness in the worse eye was significantly different between the three groups (Table 2).

In the GQL-15 scores, with the exception of the peripheral vision and glare and dark adaptation subscale scores, there were significant differences be-

TABLE 2: Demographic and clinical characteristics of the patients with glaucoma.

	Early (n=43)	Moderate (n=29)	Severe (n=20)	Total (n=92)	p values
Age (years)	61.13±11.75	63.13±11.65	59.35±15.62	61.38±12.58	0.58
Gender, n (%) male					
Glaucoma duration (years)	7.55±4.62	8.82±5.35	7.35±4.06	7.91±4.74	0.45
Education level, n (%)					
Primary school	17	12	12	41	
Secondary school	6	5	4	15	
High school	7	7	4	18	
University	13	5	0	18	
Visual acuity (worse eye), logMAR	0.07±0.16	0.20±0.32	0.96±0.90	0.30±0.58	**0.000#**
Visual acuity (better eye), logMAR	0.04±0.11	0.08±0.11	0.24±0.46	0.09±0.24	**0.008#**
RNFL thickness (worse eye)	91.44±14.45	78.24±16.16	57.60±15.31	79.92±19.97	**0.000#†**
RNFL thickness (better eye)	98.48±11.91	91.82±15.14	78.60±18.29	92.06±16.28	**0.000#**

Analysis of variance test, values are presented as mean±standard deviation unless otherwise noted; LogMAR: Logarithm of minimum angular resolution; RNFL: Retinal nerve fiber layer. *Stage 1 versus stage 2; # Stage 1 versus stage 3; † Stage 2 versus stage 3.

tween patients with Stage 1 and Stage 3 glaucoma in respect of the GQL-15 total and subscale scores (Table 3). When the NEI VFQ-25 subscale scores were examined, there were determined to be significant differences between patients with Stage 1 and Stage 3 glaucoma in respect of total score, general vision, mental health, near activities, distance activities, peripheral vision, role difficulties, and dependency. No differences were detected between patients with Stage 2 and Stage 3 glaucoma in terms of both GQL-15 and NEI VFQ-25 total and subscale scores.

As can be seen in Table 4, the multivariate linear regression analysis results showed that the NEI VFQ-25 and GQL-15 total scores were mildly associated with VA in both better and worse eyes. RNFL thickness in the better and worse eyes was significantly associated with the NEI VFQ-25 total score. GQL-15 was only associated with VA values in the better and worse eyes.

TABLE 3: Comparisons of the GQL-15 and NEI VFQ-25 scores between the patients according to the severity of glaucoma.

	Early (n=43)	Moderate (n=29)	Severe (n=20)	Total (n=92)	p values
NEI VFQ-25 total score	85.57±10.62	79.36±15.49	71.08±18.25	80.46±15.08	**0.001#**
General health	47.06±19.85	38.79±18.40	38.75±20.63	42.65±19.80	0.134
General vision	74.88±10.77	69.65±12.67	61.00±17.74	70.21±14.06	**0.001#**
Mental health	85.31±16.91	77.58±23.11	65.93±28.78	78.66±22.94	**0.006#**
Ocular pain	70.93±20.36	71.12±21.41	62.50±23.29	69.15±21.40	0.293
Near activities	84.68±18.17	76.72±19.84	72.08±22.66	79.43±20.20	**0.046#**
Distance activites	87.40±11.83	79.02±19.49	73.33±21.04	81.70±17.52	**0.006#**
Social functions	93.60±12.00	89.65±19.21	85.62±19.26	90.65±16.11	0.175
Peripheral vision	89.53±14.67	81.00±20.85	72.50±22.79	83.14±19.68	**0.004#**
Color vision	94.18±13.18	91.37±13.81	85.00±23.50	91.30±16.33	0.115
Role difficulties	79.65±22.98	70.68±27.19	58.75±27.83	72.28±26.45	**0.012#**
Dependency	95.54±13.77	86.78±20.35	74.16±29.97	88.13±21.72	**0.001#**
GQL-15 total score	25.86±8.82	28.51±14.38	35.55±17.78	28.80±14.30	**0.026#**
GQL-15 central vision	3.46±1.53	3.65±1.96	4.95±1.93	3.84±1.84	**0.008#**
GQL-15 peripheral vision	9.83±4.05	11.31±6.41	13.00±7.13	10.98±5.69	0.113
GQL-15 outdoor mobility	1.41±0.66	1.62±1.01	2.10±1.37	1.63±0.99	**0.038#**
GQL-15 glare and dark adaptation	10.97±3.87	11.86±5.76	14.15±6.10	11.94±5.14	0.073

Analysis of variance test *Stage 1 versus Stage 2; #Stage 1 versus Stage 3; † Stage 2 versus Stage 3; GQL-15: Glaucoma Quality of Life-15; NEI VFQ-25: National Eye Institute Visual Function Questionnaire.

TABLE 4: Multivariate linear regression analysis of quality of life and clinical variables.

	NEI VFQ-25		GQL-15	
Variables	**ß (95% CI)**	**p value**	**ß (95% CI)**	**p value**
BE visual acuity	-0.008 (-0.011 to -0.005)	**0.001**	-0.130 (-0.241 to -0.019)	**0.023**
WE visual acuity	-0.015 (-0.023 to -0.008)	**0.001**	-0.067 (-0.342 to 0.208)	**0.004**
BE RNFL thickness	0.228 (0.007 to 0.449)	**0.043**	-0.246 (-0.495 to 0.003)	0.053
WE RNFL thickness	0.320 (0.051 to 0.589)	**0.020**	-0.257 (-0.564 to 0.05)	0.100

Multivariate linear regression, bold items indicate statistical significance; NEI VFQ-25: National Eye Institute Visual Function Questionnaire; GQL-15: Glaucoma Quality of Life Questionnaire; CI: Confidence interval; BE: Better eye; WE: Worse eye; RNFL: Retinal nerve fiber layer.

TABLE 5: Correlation analysis between quality of life and clinical variables.

		BE visual acuity	WE visual acuity	BE RNFL thickness	WE RNFL thickness
NEI VFQ-25					
Total score	r value	-0.462	-0.397	0.211	0.241
	p value	**0.000**	**0.000**	0.043	**0.020**
General health	r value	-0.214	-0.194	0.218	0.219
	p value	**0.041**	**0.063**	0.037	**0.036**
General vision	r value	-0.457	-0.390	0.272	0.269
	p value	**0.001**	**0.001**	0.009	**0.010**
Mental health	r value	-0.320	-0.378	0.186	0.231
	p value	**0.002**	**0.001**	0.075	0.057
Ocular pain	r value	-0.113	-0.229	-0.073	0.066
	p value	**0.283**	**0.028**	0.487	0.533
Near activities	r value	-0.379	-0.214	0.193	0.205
	p value	**0.001**	**0.041**	0.065	0.050
Distance activites	r value	-0.486	-0.327	0.195	0.204
	p value	**0.001**	**0.001**	0.063	0.051
Social functions	r value	-0.426	-0.253	0.158	0.086
	p value	**0.001**	**0.015**	0.132	0.414
Peripheral vision	r value	-0.403	-0.313	0.195	0.205
	p value	**0.001**	**0.002**	0.063	0.050
Color vision	r value	-0.426	-0.253	0.158	0.086
	p value	**0.001**	**0.015**	0.132	0.414
Role difficulties	r value	-0.482	-0.297	0.201	0.177
	p value	**0.001**	**0.004**	0.054	0.091
Dependency	r value	-0.245	-0.233	0.136	0.182
	p value	**0.019**	**0.026**	0.196	0.082
GQL-15					
Total score	r value	0.430	0.298	-0.203	-0.173
	p value	**0.001**	**0.004**	0.053	0.100
Central vision	r value	0.409	0.304	-0.163	-0.179
	p value	**0.001**	**0.001**	0.121	0.088
Peripheral vision	r value	0.362	0.306	-0.157	-0.169
	p value	**0.001**	**0.003**	0.135	0.107
Outdoor mobility	r value	0.345	0.303	-0.101	-0.164
	p value	**0.001**	**0.003**	0.340	0.118
Glare and dark adaptation	r value	0.353	0.251	-0.187	-0.134
	p value	**0.001**	**0.016**	0.075	0.202

Pearson correlation test, bold items indicate statistical significance; BE: Better eye; WE: Worse eye; RNFL: Retinal nerve fiber layer; NEI VFQ-25: National Eye Institute Visual Function Questionnaire; GQL-15: Glaucoma Quality of Life Questionnaire.

As seen in Table 5, Pearson correlation analysis revealed that NEI VFQ-25 total and almost all subscale scores were significantly negatively correlated with VA in the better and worse eyes. RNFL thickness in the better eye and the worse eye was significantly correlated with total score, general health and general vision subscales of NEI VFQ-25 with poor rho values. VA in both the worse and better eye was significantly correlated with GQL-15 total and subscale scores. RNFL thickness in both eyes showed no significant correlation with GQL-15 total and subscale scores.

DISCUSSION

The aim of this study was to investigate the relationship between QoL and objective clinical measures and to compare the level of QoL according to the severity of glaucoma. The study results showed that NEI VFQ-25 total scores and some subscales were higher while total GQL-15 total score, outdoor mobility and central vision scores were lower in mild glaucoma cases. The NEI VFQ-25 total and subscale scores were determined to be significantly correlated with VA and RNFL thickness. These results may indicate that although GQL-15 is a glaucoma-specific measurement tool, it was not associated with RNFL thickness according to both the correlation and regression analyses.

These findings were consistent with those of a previous study in which NEI VFQ-25 and GQL-15 total scores showed significant differences among the groups which were categorized according to glaucoma severity.[22] Despite the absence of significant differences for some subscales of NEI VFQ-25 (general health, ocular pain, social functions, color vision) and GQL-15 (peripheral vision and glare and dark adaptation) between the three groups in the current study, it can be proposed that both questionnaires can discriminate patients according to the level of glaucoma severity. The peripheral vision subdomain of the NEI VFQ-25 differed among the three groups, but the items related to the dark peripheral vision subdomain of the GQL-15 failed to show a difference. From these findings, it can be suggested that the NEI VFQ-25 may be more sensitive in the evaluation of peripheral vision.

The impact of glaucoma extends beyond visual impairment and affects various aspects of patients' lives, including their QoL, daily activities, and visual function. This study emphasizes the correlation between glaucomatous damage and vision-related QoL, which has been extensively investigated in previous research.[5-9] Studies have consistently demonstrated that glaucoma has a negative influence on QoL, and the severity of glaucomatous damage is associated with poorer QoL outcomes.[10-12]

Past research has focussed on the relationship between VF, VA, contrast sensitivity (CS), IOP, RNFL thickness and vision-related QoL.[13] Of these parameters, VA and CS have been shown to be better predictors of QoL than VF.[23] Another study reported the superiority of CS and VF over other clinical measures.[10] However, the results of the VF, VA and CS assessments depend on the understanding and the emotional state of the patients.[22] As an objective structural measure, RNFL provides information about the relationship between vision-related disability and glaucomatous damage.[17] Thinning of the RNFL is more detectable before the presence of impairment in the VF.[24] Gracitelli et al. investigated the relationship between progressive RNFL thinning and vision-related QoL and concluded that the loss of RNFL thickness is associated with worse QoL.[25] Positive correlations of the results of structural and clinical measures and vision-related QoL have been reported previously, but how glaucomatous damage affects vision-related QoL has not been evaluated using a glaucoma-specific questionnaire (GQL-15).

In terms of objective structural measures, RNFL thickness has been shown to provide valuable information about the relationship between glaucomatous damage and vision-related disability.[17] As thinning of the RNFL can be detected before the onset of VF impairment, it is a potentially useful early indicator of glaucoma progression.[24]

Many studies have been conducted to investigate the relationship between objective markers of glaucoma and the level of QoL using both questionnaires, but to the best of our knowledge no studies have compared their association with RNFL thickness. The current study findings showed that RNFL thickness, a structural parameter, was associated with the NEI

VFQ-25 questionnaire and not with the GQL-15 questionnaire. Moreover, with the exception of general health, general vision and total score of NEI VFQ-25, the other subscales of this questionnaire were not correlated with RNFL thickness.

One reason why the glaucoma-specific GQL-15 questionnaire is not correlated with the RNFL and the general NEI VFQ-25 questionnaire correlates with the RNFL may be that the RNFL does not adequately reflect deterioration in the functional status of the glaucoma patient. It is clear that further studies are needed to determine this. There are many studies in literature on the ability of RNFL to reflect glaucoma. These studies have generally focussed on the sensitivity of the RNFL thickness measurement in diagnosing glaucoma, its use in monitoring progression, and evaluating the response to treatment. RNFL thickness may have a high value in diagnosing glaucoma early and monitoring its progression. However, it is important to support it with other clinical findings and tests when used alone.

Although there are many sources in the literature confirming that the RNFL fully reflects glaucoma, it is important to remember that glaucoma is a complex disease and a single measurement or test alone is not sufficient. A comprehensive clinical evaluation and a combination of various tests are required for a complete evaluation of glaucoma.[26,27]

The results of this study showed that both the NEI VFQ-25 and GQL-15 total scores were associated with VA. It was observed that the total scores of NEI VFQ-25 and GQL-15 were correlated with VA in the good eyes at a similar level, while there was a stronger correlation of the NEI VFQ-25 score in the worse eyes.

This study underscores the value of RNFL thickness as an objective structural measure that reflects the relationship between glaucomatous damage and vision-related disability. While there is evidence supporting positive correlations of structural and clinical measures with vision-related QoL, the specific impact of glaucomatous damage on QoL using glaucoma-specific questionnaires such as the GQL-15 has not yet been fully elucidated.[16] Therefore, there is a clear need for comprehensive studies that employ both structural and functional measures alongside glaucoma-specific QoL questionnaires.

There were some limitations in this study, primarily that it was conducted in a single centre and with a limited number of patients. Response analysis was not performed as the patients had generally been diagnosed with glaucoma a few years previously and were using anti-glaucoma medication throughout the study period. Future longitudinal studies should be planned, starting from the diagnosis of the disease, following up the patients and investigating the effect of the disease on QoL.

CONCLUSION

The results of the questionnaires used in this study clearly showed that glaucoma significantly affects QoL. When the relevance of this to the anatomic structure was examined, RNFL thickness loss was seen to be associated with the NEI VFQ-25 scores, but not with the GQL-15 scores.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Yücel Öztürk;* ***Design:*** *Yücel Öztürk, Alev Özçelik Köse;* ***Control/Supervision:*** *Serhat İmamoğlu;* ***Data Collection and/or Processing:*** *Yücel Öztürk, Aysun Yücel Gençoğlu, Hatice Tekcan;* ***Analysis and/or Interpretation:*** *Yücel Öztürk, Okşan Alpoğan;* ***Literature Review:*** *Yasemin Ün, Yücel Öztürk;* ***Writing the Article:*** *Yücel Öztürk;* ***Critical Review:*** *Serhat İmamoğlu;* ***References and Fundings:*** *Aysun Yücel Gençoğlu;* ***Materials:*** *Yücel Öztürk.*

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