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Quality of life among people with glaucoma: analysis according to the defect in the visual field

Qualidade de vida de pessoas com glaucoma: análise conforme o defeito no campo visual

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Abstract

Objective: *To analyze the quality of life among people with glaucoma according to the visual field defect.* ***Methods:*** *This is a cross-sectional, analytical study carried out in an ophthalmology unit, Glaucoma Project, in Montes Claros, Minas Gerais, Brazil. Patients' quality of life was assessed using the National Eye Institute 25-Item Visual Function Questionnaire (NEI-VFQ-25). The Mean Deviation (MD) parameter of the best eye was used to classify the visual field defects in mild, moderate and severe.* ***Results:*** *Four-hundred patients participated, 60.5% female. The participants' ages ranged from 19 to 80 years, the majority being over 60 (55.8%). The majority of patients presented a visual defect, regardless of whether they were referred by the public or private sector (p = 0.840). The mean quality of life score was 77.62 (± 18.007) points. The subdomain with worse mean was 'ocular pain' (53.06 ± 26.088) and with better mean was 'color vision' (94.13 ± 19.207). A negative linear correlation was observed between the quality of life scores and the visual field MD, both of the right (MD-OD) and left eye (MD-OE). Among the subdomains of quality of life, 'dependency' was the one that best explains the variation of the visual field defect and vice versa, with a determination factor equal to 7.2% for MD-OD and 8.4% for MD-OE.* ***Conclusion:*** *Visual field loss was related to poor quality of life among people with glaucoma. It is recommended to provide early diagnosis to favor treatment and delay in disease progression.*

Keywords: *Glaucoma; Quality of life; Visual fields; Survey and questionnaires. Vision disorders*

Resumo

Objetivo: Analisar a qualidade de vida de pessoas com glaucoma conforme o defeito no campo visual. **Métodos:** Trata-se de estudo transversal, analítico, conduzido em unidade de atenção especializada em oftalmologia, Projeto Glaucoma, em Montes Claros, Minas Gerais, Brasil. A qualidade de vida dos pacientes foi avaliada por meio do National Eye Institute 25-Item Visual Function Questionnaire (NEI-VFQ-25). Utilizou- se o parâmetro Mean Deviation (MD) do melhor olho para classificar os defeitos de campo visual em leve, moderado e severo. **Resultados:** Participaram 400 pacientes, 60,5% do sexo feminino. A idade dos participantes variou de 19 a 80 anos, sendo a maioria acima de 60 anos (55,8%). A maioria dos pacientes apresentou defeito leve no campo visual, independente de ter sido referenciado pelo setor público ou privado (p=0,840). O escore médio de qualidade de vida foi 77,62(±18,007) pontos. O subdomínio com pior média foi 'dor ocular' (53,06±26,088) e com melhor média foi 'visão de cores' (94,13±19,207). Destacou-se uma correlação linear negativa entre os escores de qualidade de vida e o MD do campo visual, tanto do olho direito (MD-OD) como do esquerdo (MD-OE). Entre os subdomínios de qualidade de vida, 'dependência' foi a que melhor explica a variação do defeito de campo visual e vice-versa, com fator de determinação igual a 7,2% para o MD-OD e 8,4% para o MD-OE. **Conclusão:** A perda de campo visual foi relacionada à pior qualidade de vida entre pessoas com glaucoma. Recomenda-se propiciar o diagnóstico precoce para favorecer o tratamento e o retardo na progressão da doença.

Descritores: Glaucoma; Qualidade de vida; Campos visuais; Inquéritos e questionários; Transtornos da visão

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Introduction

Glaucoma is the leading cause of irreversible blindness in the world.[1] Visual loss may negatively reflect the quality of life (QoL) of people with glaucoma.

According to the World Health Organization (WHO), QoL is the individual's perception of their position in life in the context of the culture and value system in which they live and in relation to their goals, expectations, standards and concerns.[2] The concept of QoL comprises the individual's health status, physical, psychological well-being, and a good social and cognitive performance capacity. In medicine, QoL in health encompasses different dimensions, both in relation to the patient's concern with their disease and its consequences, as well as the functional disorder caused by the disease and the adverse effects of treatment.[3]

The QoL of the glaucoma patient is affected by different reasons as by the loss of visual function; fear and anxiety related to the disease, since it is a chronic pathology with a potential for evolution to blindness; difficulty in the daily routine of treatment; side effects and cost of therapy.[4] The effect of functional impairment on QoL caused by glaucoma is mainly due to the difficulties experienced by patients in performing vision-related activities of their daily life, such as reading, driving, walking, going up and down the stairs, domestic tasks (sewing and cooking), and limitations in social relations.[5] Usually, the more advanced the pathology, the worse the QoL.[6] QoL in patients with visual impairment can be assessed by the Visual Function Questionnaire of the National Eye Institute 25 (NEI VFQ-25).[7]

Assessing the QoL of patients with glaucoma is a current issue and of great importance, mainly due to the impact resulting from the final evolution of the disease.[8] In this perspective, the present study aimed to analyze the quality of life of people with glaucoma according to the defect in the visual field.

Methods

This is a cross-sectional, analytical study carried out in a specialized care unit in ophthalmology, Glaucoma Project, in Montes Claros, Minas Gerais, Brazil, held by the Brazilian Single Health System - SUS. The sample calculation for participation in the study was based on the formula for infinite population available in the program Epi Info® version 3.5.1. We took into consideration the universe of glaucoma patients enrolled in said Project (n=4.005), the prevalence of the "quality of life" outcome equal to 50.0%, the sample error of 5.0%, and the 95% confidence interval. The minimum sample was defined as 348 people, plus 10.0% for any losses. However, 400 glaucoma patients of both genders were invited to participate in the study. The inclusion criteria were: age between 18 and 80 years, and be on ambulatory treatment with eyedrops.

The data was collected among patients treated during the months of July to September of 2016. The project was approved by the Research Ethics Committee involving human beings of Universidade Estadual de Montes Claros – Unimontes, opinion nº1,571,494. As it was a research involving human beings, all the participants signed the Free and Informed Consent Term. The research complied with the ethical guidelines, and was implemented in accordance with the Declaration of Helsinki.

The questionnaire used for data collection was the National Eye Institute 25-Item Visual Function Questionnaire (NEI-VFQ-25), developed to measure the visual function and the impact on quality of life for a variety of ocular conditions(7,9). It has 25 questions grouped into 12 subdomains: 'general health', 'general sight', 'eye pain', 'activities for near-sight', 'activities for far-sight', 'social aspects', 'mental health', 'activities of daily life', 'dependence', 'ability for driving', 'color vision' and 'peripheral vision'.

Scoring the NEI-VFQ-25 is a two-step process. In the first one, the original numerical values of the research are recoded, with each item being converted to a scale of 0 to 100 points. In this format, the score represents the percentage achieved of the total possible score, for example, a score of 50 represents 50% of the highest possible score. In the second step, the items within each subdomain are evaluated. The score represents the average of all subdomain items to which the patient responded. In order to calculate the general NEI-VFQ-25 score, a simple average score of each subdomain is calculated excluding 'general health'. The higher the score achieved, the better the quality of life. In addition to the 25 questions from the NEI-VFQ-25, 14 questions were added to the current research for a better evaluation of the subdomains(7,9).

In addition to the data collected with the QoL questionnaire, the patients' medical records were used in relation to the visual field. In the Glaucoma Project, computerized perimetry is performed by the Tendency Oriented Perimetry – TOP, in the device Octopus 311, of HAAG-STREIT INTERNATIONAL. From the clinical data, visual field defects were classified into three categories, mild, moderate or severe, according to the Mean Deviation (MD) value presented in the best eye. The mild defect was defined as MD values lower than 6 decibels (dB), the moderate defect between 6 and 12 dB, and the severe defect above 12 dB. The MD of the best eye of each patient was chosen, since this information can be more easily integrated into the clinical decision making, being considered a robust and significant method to report the severity of visual field loss(10).

Data was submitted to statistical treatment in the IBM SPSS® Version 22.0 Program. The descriptive statistical analysis involved measures of central tendency and calculation of proportions. Pearson's chi-square test was used for comparisons between visual field defects and patients' origin, if they were referred by the public or private health service. The medians of the general score and subdomains of QoL were compared according to the defects in the visual field by the Kruskal-Wallis test, since the data did not present standards of normality (Kolmogorov-Smirnov test $p<0,001$). Spearman's correlation between general score and subdomains of QoL was made with the right eye MD (MD-RE) and left eye (MD-LE). For all statistical tests the significance level of 5% was considered.

Results

The study comprised a total of 400 patients with glaucoma, 60.5% female. The majority of patients was over 60 years of age (55.8%), with education between one and nine years of schooling (65.2%), and one to five years of diagnosis (48.3%), as shown in Table 1.

Table 1
Description of patients with glaucoma regarding gender, age, years of study and diagnosis

Variables		n	%
Gender	Female	242	60.5
	Male	158	39.5
Age	19-39	27	6.8
	40-59	150	37.5
	60-80	223	55.7
Years of study	Illiterate	34	8.5
	1 a 9	261	65.2
	10 a 12	74	18.5
	13 or more	31	7.8
Years of diagnosis	<1 year	50	12.5
	1 a 5 years	193	48.3
	6 a 10 years	97	24.3
	11 a 15 years	33	8.3
	16 or more	27	6.8

As shown in Table 2, the majority of the patients (n = 234) come from health care services linked to the public sector, i.e., SUS. The defect in the visual field of the best eye was classified as mild intensity for 70.1%. Patients' origin was not associated with the visual field defect, both in the public and private sectors, and the majority presented mild defect (p = 0.840).

Table 2
Distribution of patients with glaucoma according to referral origin and visual field defect in the best eye

Origin	Defect			Total*
	Mild	Moderate	Severe	p**
Public Sector	165(70.5%)	31(13.2%)	38(16.3%)	234(100.0%)
				0,840
Private Sector	104(69.3%)	23(15.3%)	23(15.4%)	150(100.0%)
Total	269 (70.1%)	54(14.1%)	61(15.8%)	384(100.0%)

*loss of respondents / ** Pearson's Chi square

The average of the overall score for the questionnaire of quality of life was 77.62 (± 18.00) points, and the median was 84.08. The lowest average was for the 'ocular pain' subdomain (53.06 ± 26.08), and the best one was for 'color vision' (94.13 ± 19.20), as presented in Table 3.

Table 3
Score of the items general health, general score and subdomains of quality of life (QoL) of patients with glaucoma

General Health, Overall Score and subdomains of QoL	N	Minimum	Maximum	Average	Standard Deviation	Median
General Health	399	0.00	100.00	54.45	16.83	52.50
Overall Score of QoL	400	13.46	99.55	77.62	18.00	84.08
Subdomains of QoL						
General sight	400	10.00	100.00	68.50	17.21	70.00
Ocular pain	400	0.00	100.00	53.06	26.08	50.00
Near-sight activities	400	0.00	100.00	78.79	24.57	87.50
Far-sight activities	400	0.00	100.00	80.29	24.61	90.00
Social aspects	400	8.33	100.00	91.96	16.97	100.00
Mental health	400	0.00	100.00	67.83	25.70	80.00
Activities of daily	400	0.00	100.00	80.60	23.86	87.50
Dependence	400	0.00	100.00	81.37	29.05	100.00
Ability to drive	79*	16.67	100.00	82.72	20.90	91.67
Color vision	396*	0.00	100.00	94.13	19.20	100.00
Peripheral vision	400	0.00	100.00	80.38	27.86	100.00

*losses of respondents

There were significant differences (p<0.05) between the medians of the general score and the subdomains 'general sight', 'near-sight activities ', 'far-sight activities', 'social aspects', 'mental health', 'activities of daily life', 'dependence', 'ability to drive', 'color vision' and 'peripheral vision' depending on the defects in the visual field. It was observed that patients with mild defects presented higher medians, which represents a better quality of life when compared to patients with moderate and severe defects in the visual field of the best eye (Table 4).

There was a negative linear correlation between the quality of life scores and the visual field MD, both for the right (MD-RE) and the left (MD-LE) eye. It means that the worse the defect in the field, the greater the impairment in quality of life, being this association significant for the general score and for the subdomains 'general sight', 'activities for near-sight', 'activities for far-sight', 'social aspects', 'mental health', 'activities of daily life', 'dependence', 'color vision' and 'peripheral vision' (p <0.05). General health is also compromised by major defects in the visual field of the left eye (R = -0,113). The subdomain 'dependence' is the one that best explains the variation of the visual field loss variable and vice versa, with the factor determination of this variation being equal to 7.2% for MD-RE and 8.4% for MD-LE (Table 5)

Table 4
Medians of general health, general score and subdomains of quality of life (QoL) according to visual field defects in the best eye in patients with glaucoma

General Health, Overall Score and subdomains of QoL	Defect in the visual field			
	Mild	Moderate	Severe	p*
General Health	52,50	60.00	52.50	0.272
Overall Score of QoL	85,83	81.82	67.97	<0.001
Subdomains of QoL				
General sight	72,50	70.00	65.00	0.003
Ocular pain	50,00	50.00	50.00	0.155
Near-sight activities	91,67	80.00	66.67	<0.001
Far-sight activities	92,71	87.50	66.67	<0.001
Social aspects	100,00	100.00	100.00	<0.001
Mental health	80,00	80.00	55.00	<0.001
Activities of daily	93.75	87.50	68.75	<0.001
Dependence	100.00	93.75	68.75	<0.001
Ability to drive	91.67	80.00	66.67	0.022
Color vision	100.00	100.00	100.00	<0.001
Peripheral vision	100.00	100.00	75.00	<0.001

* Kruskal-Wallis H test

Table 5
Correlation between general health, general score and subdomains of quality of life (QoL) with Mean Deviation (MD) of right eye (RE) and left eye (LE) of patients with glaucoma

General Health, Overall Score and subdomains of QoL	Visual field			
	MD RE(R)*	p*	*MD LE(R)*	p**
Saúde geral	-0.063	0.227	-0.113	0.030
Escore geral da QV	-0.239	<0.001	-0.247	<0.001
Subdomínios da QV				
General sight	-0.168	<0.001	-0.176	<0.001
Ocular pain	-0.081	0.120	-0.041	0.435
Near-sight activities	-0.211	<0.001	-0.243	<0.001
Far-sight activities	-0.233	<0.001	-0.213	<0.001
Social aspects	-0.230	<0.001	-0.212	<0.001
Mental health	-0.184	<0.001	-0.225	<0.001
Activities of daily	-0.187	<0.001	-0.180	0.001
Dependence	-0.269	<0.001	-0.291	<0.001
Ability to drive	-0.208	0.075	-0.071	0.546
Color vision	-0.112	0.031	-0.159	0.002
Peripheral vision	-0.173	<0.001	-0.180	<0.001

*Correlation coefficient (R); **Spearman Correlation Test

Discussion

The present study investigated the QoL of patients with glaucoma and made an analysis according to visual field defects classified as mild, moderate and severe. It was observed that people with mild defects in the visual field have a better quality of life than those with moderate and severe defects.

The present study showed a predominance of patients over 60 years (55.8%). A similar result to the findings of a national[11] and international study[12], with greater involvement of glaucoma in this age group.

Studies on glaucoma prevalence are gender divergent. The results of the current study showed a predominance of women (60.5%), similar to that found in other studies.[13,14] However, they were different from other investigations showing a higher prevalence among men.[15,16]

Most of the glaucomatous patients were referred to the specialized service from the attention points linked to the public sector, without association with the visual field defect classification (p = 0.840). Similar data was found in the study developed by Pinheiro et al.[8], who observed similar perimetric MD values both for patients from public and private institutions. In the current study, the majority of patients in the public and private sectors presented mild defect in the visual field, an important result of early treatment and preservation of visual function and quality of life.

The NEI-VFQ-25 is a commonly used questionnaire to assess vision-related quality of life in patients with glaucoma. This disease negatively affects the overall score and the various subdomains of NEI-VFQ-25, and this effect is correlated with the severity of loss of glaucomatous visual field.[17-20]

In the present study, the average overall score for quality of life for the patient group was 77.62 points. Similar values were found in different studies, such as in Pinheiro[8] – 73.13 and in the Los Angeles Latino Eye Study(21) – 76.45. The Early Manifest Glaucoma Trial[22] showed that the average was higher - 88.8, as in the study by Onakoya et al.[23] - 85.2 points. The current study found worse averages for the subdomains 'eye pain', 'mental health' and 'general sight', and better averages for 'color vision' and 'social aspects'.

When correlating the scores obtained in the instrument of quality of life with the values of the defect in the visual field, it was verified that for the general score and for the subdomains 'general sight', 'near-sight activities', 'far-sight activities', 'mental health', 'activities of daily life', 'dependence', 'ability to drive', 'color vision', and 'peripheral vision' there were statistically significant associations (p<0.05). Patients with mild defects in general presented higher medians in the NEI-VFQ-25, which represents a better QoL when compared to patients with moderate and severe defects in the visual.

In the research Early Manifest Glaucoma Trial (EMGT)[22], although the patients presented good results in terms of quality of life, there was a statistically significant correlation between the NEI-VFQ-25 values and low visual acuity in the best eye, worse perimetric MD and crystalline opacities. A recent EMGT report(24) after 20 years of follow-up showed that patients with visual field loss in the best eye greater than 50.0% (e.g., VFI worse than 50.0% or MD lower than -18 dB) had lower NEI-VFQ-25 scores (p <0.001). These results support the arbitrary but widely used limit of visual field loss in the best eye greater than 50% as an important threshold for severe functional impairment.

Another investigation[25] used MD values in the best eye to classify patients with glaucoma in three phases (early onset, moderate and advanced). Overall quality of life and vision-related quality of life were assessed at each stage of the disease. A difference was found between the early onset, moderate and advanced phases, with a progressive reduction in the perception of quality of life throughout the stages of the disease, reinforcing the need to prevent the progression of the disease.

The Los Angeles Latino Eye Study (LALES)[6] was a population study of ocular disease prevalence in Latinos living in Los Angeles, California, aged 40 years and older. Data from

213 patients with primary open-angle glaucoma was analyzed to determine the impact of visual field loss on quality of life. Patients with severe visual field loss had lower quality of life scores than patients without loss or with initial visual field loss. The correlation coefficients of the best eye were significant for the overall score and for six subdomains of the NEI-VFQ-25.

In this study, a negative linear correlation was identified between the quality of life scores and the visual field MD, both in the right and left eye, being significant for the general score and for nine subdomains of the NEI-VFQ-25. Similar data was found by Sawada, Fukuchi, Abe[26], who observed a significant relation between quality of life and visual field in the general score and nine subdomains of NEI-VFQ-25, both in the best and the worst eye. A significant relation was found between the quality of life and the visual field parametric index (MD). Likewise, different studies have reported the loss of visual acuity and the visual field as one of the causes associated with lower quality of life in patients with glaucoma.[18-20,24] Patients with advanced glaucoma have greater difficulty to perform the specific activities of daily life, and a positive correlation was observed between the severity of the defect in the visual field and the limitations in the activities evaluated, such as wandering in places with obstacles and irregular floor.[27] The professional plays an important role in preserving and improving the quality of life of patients with glaucoma through appropriate therapy and good interpersonal relationship with patients.[3]

The limitations of the current study should be considered, because it is cross-sectional and the patient follow-up was not evaluated, so the significant associations between QoL and visual field do not show a cause and effect relation. In addition, patients with different types of glaucoma such as primary open-angle glaucoma, normal-pressure glaucoma, primary closed-angle glaucoma, and secondary glaucoma were included in the present study, and we should consider the that visual field defect patterns may interfere on them. Although the present study evaluated visual field measures, other measures of visual function such as sensitivity to contrast and brightness, which may contribute to the patient's quality of life, especially in the ability to drive, were not evaluated. The choice for non-probabilistic sampling is justified by the fact that the research involves patients living in the North of Minas Gerais and with possible reduction of visual field or blindness, which would compromise the displacement to the service only for participation in the research. Thus, the patients undergoing treatment were invited during the period of data collection.

Conclusion

The findings of the present study demonstrate that people with glaucoma with greater impairment in the visual field have worse quality of life. The importance of the present study is emphasized by an expressive number of patients (n = 400) from an emblematic region of Brazil, far from large centers and encompassing a socio-culturally underprivileged population. It is recommended to provide an early diagnosis to promote treatment and delay in the progression of the disease, and new investigations are suggested for longer periods of follow-up to help clarify the changes in the quality of life from the evolution of glaucoma.

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References

1. Quigley HA, Broman AT. The number of people with glaucoma worldwide in 2010 and 2020. Br J Ophthalmol. 2006;90(3):262–7.
2. World Health Organization Quality of Life Group. Development of the WHOQOL: Rationale and Current Status. Int J Ment Health. 1994;23(1):24–56.
3. Guedes RA. Quality of life and glaucoma. Rev Bras Oftalmol. 2015;74(3):131–2.
4. Kaur D, Gupta A, Singh G. Perspectives on Quality of Life in Glaucoma. J Curr Glaucoma Pract. 2012;6(1):9–12.
5. Ramulu P. Glaucoma and disability: which tasks are affected, and at what stage of disease? Curr Opin Ophthalmol. 2009;20(2):92–8.
6. McKean-Cowdin R, Varma R, Wu J, Hays RD, Azen SP; Los Angeles Latino Eye Study Group. Severity of visual field loss and health-related quality of life. Am J Ophthalmol. 2007;143(6):1013–23.
7. Mangione CM, Lee PP, Gutierrez PR, Spritzer K, Berry S, Hays RD; National Eye Institute Visual Function Questionnaire Field Test Investigators. Development of the 25-item National Eye Institute Visual Function Questionnaire. Arch Ophthalmol. 2001;119(7):1050–8.
8. Pinheiro DP, Rosa ML, Velarde LG, Lomelino JP, Knopp PE, Ventura MP. Qualidade de vida em portadores de glaucoma: comparação entre pacientes do sistema público de saúde e clínica privada. Rev Bras Oftalmol. 2010;69(6):378–82.
9. Simão LM, Lana-Peixoto MA, Araújo CR, Moreira MA, Teixeira AL. The Brazilian version of the 25-Item National Eye Institute Visual Function Questionnaire: translation, reliability and validity. Arq Bras Oftalmol. 2008;71(4):540–6.
10. Arora KS, Boland MV, Friedman DS, Jefferys JL, West SK, Ramulu PY. The Relationship between Better-Eye and Integrated Visual Field Mean Deviation and Visual Disability. Ophthalmology. 2013 December; 120(12). Disponível em: < https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3834089/>. Acesso em: 01/04/2017.
11. Salai AF, Souza TT, Adam Netto A, Oliveira LS, Shimono CT, Cunha RD. Perfil clínico epidemiológico de pacientes com glaucoma encaminhados ao serviço de oftalmologia do Hospital Universitário da Universidade Federal de Santa Catarina. ACM Arq Catarin Med. 2011;40(3):37–42.
12. Akpek EK, Smith RA. Overview of age-related ocular conditions. Am J Manag Care. 2013;19(5 Suppl):S67–75.
13. Cook C, Foster P. Epidemiology of glaucoma: what's new? Can J Ophthalmol. 2012 ;47(3):223–6.
14. Vajaranant TS, Wu S, Torres M, Varma R. The changing face of primary open-angle glaucoma in the United States: demographic and geographic changes from 2011 to 2050. Am J Ophthalmol. 2012;154(2):303–314.e3.
15. Tham YC, Li X, Wong TY, Quigley HA, Aung T, Cheng CY. FRCS, Harry A. Quigley, Tin Aung, FRCS, Ching-Yu Cheng. Global prevalence of glaucoma and projections of glaucoma burden through 2040 - a systematic review and meta-analysis. Ophthalmology. 2014;121(11):2081–90.
16. Zhao Y, Fu JL, Li YL, Li P, Lou FL. Epidemiology and clinical characteristics of patients with glaucoma: an analysis of hospital data between 2003 and 2012. Indian J Ophthalmol. 2015;63(11):825–31.
17. Nassiri N, Mehravaran S, Nouri-Mahdavi K, Coleman AL. National Eye Institute Visual Function Questionnaire: usefulness in glaucoma. Optom Vis Sci. 2013;90(8):745–53.
18. Qiu M, Wang SY, Singh K, Lin SC. Association between visual field defects and quality of life in the United States. Ophthalmology. 2014;121(3):733–40.
19. Medeiros FA, Gracitelli CP, Boer ER, Weinreb RN, Zangwill LM, Rosen PN. Longitudinal changes in quality of life and rates of progressive visual field loss in glaucoma patients. Ophthalmology. 2015;122(2):293–301.
20. Orta AÖ, Öztürker ZK, Erkul SÖ, Bayraktar, Yilmaz OF. The correlation between glaucomatous visual field loss and vision-related quality of life. J Glaucoma. 2015;24(5):e121–7.

21. McKean-Cowdin R, Wang Y, Wu J, Azen SP, Varma R; Los Angeles Latino Eye Study Group. Impact of visual field loss on health-related quality of life in glaucoma: the Los Angeles Latino Eye Study. Ophthalmology. 2008;115(6):941–948.e1.
22. Hyman LG, Komaroff E, Heijl A, Bengtsson B, Leske MC; Early Manifest Glaucoma Trial Group. Treatment and vision-related quality of life in the early manifest glaucoma trial. Ophthalmology. 2005;112(9):1505–13.
23. Onakoya AO, Mbadugha CA, Aribaba OT, Ibidapo OO. Quality of life of primary open angle glaucoma patients in lagos, Nigeria: clinical and sociodemographic correlates. J Glaucoma. 2012;21(5):287–95.
24. Peters D, Heijl A, Brenner L, Bengtsson B. Visual impairment and vision-related quality of life in the Early Manifest Glaucoma Trial after 20 years of follow-up. Acta Ophthalmol. 2015;93(8):745–52.
25. Wolfram C, Lorenz K, Breitscheidel L, Verboven Y, Pfeiffer N. Health- and vision-related quality of life in patients with ocular hypertension or primary open-angle glaucoma. Ophthalmologica. 2013;229(4):227–34.
26. Sawada H, Fukuchi T, Abe H. Evaluation of the relationship between quality of vision and the visual function index in Japanese glaucoma patients. Graefes Arch Clin Exp Ophthalmol. 2011;249(11):1721–7.
27. Miguel AI, Fonseca C, Oliveira N, Henriques F, Silva JF. Difficulties of daily tasks in advanced glaucoma patients - a videotaped evaluation. Rev Bras Oftalmol. 2015;74(3):164–70.

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