

Article

## Evaluating Health Outcomes for Iraqi Patients with Glaucoma

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**Abstract:** This study evaluates the clinical outcomes of Iraqi patients with glaucoma, a leading cause of irreversible blindness globally. Despite its prevalence, knowledge gaps persist regarding its management and impact on patients' quality of life. We conducted a cross-sectional analysis involving 87 glaucoma patients aged 30-60 from various Iraqi hospitals between February 2023 and April 2024. Comprehensive examinations, including visual acuity and intraocular pressure tests, and the Glaucoma Quality of Life Questionnaire-15 (GQL-15) were employed to assess patients' vision and quality of life. Findings indicated significant visual impairment and quality of life reduction, particularly among older patients, highlighting the need for improved educational and therapeutic strategies to manage glaucoma effectively and enhance patients' life quality. The implications underscore the critical role of sustained visual function in maintaining independence and well-being in glaucoma patients.

**Keywords:** Glaucoma, Quality of life, Complications, Diabetes Mellitus and Hypertension, Visual Field Defect (VFD)

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### 1. Introduction

Glaucoma is currently the leading cause of irreversible blindness worldwide. It is estimated that by 2025, this pathology will affect 76 million people and that it will increase to 114.9 million people by 2042 [1 – 4]. These figures are justified if we take into account the increase in life expectancy over time and the fact that glaucoma has a close relationship with increasing age [5,6].

Among the therapeutic options for managing IOP as a first step, medication in ophthalmic drops (eye drops) that are administered or given to the patient is generally considered [2,4,5,7,8,9]. Following this therapeutic step, we find laser procedures at the level of the trabecular meshwork and surgeries in selected cases [10].

Taking into account the different glaucoma treatment options, we see that in the initial management, the correct administration of medication is essential, both in its schedule and in its continuity [11,12]. It has been shown that compliance with treatment can be improved with health education, expanding the basic and essential knowledge about their disease in the affected population, as has been seen in other chronic pathologies, where collaboration on the part of the patient is very important [13].

At the international level, in different descriptive studies, it has been shown that there are gaps in the knowledge of glaucoma in patients affected by this disease. Between 10% and 60% of the respondents answered satisfactorily the different questionnaires carried out to assess their knowledge [14 – 17].

Therefore, among patients with glaucoma, there is a lack of knowledge of their disease; this being an important point to improve through different strategies, including health education. In a 2014 British publication, only 24% of glaucoma patients surveyed knew anything about the disease. There were no significant differences between social classes or educational levels [18,19,20].

In another study carried out in two specialized glaucoma units in healthcare centers in 2 countries (one in Brazil and the other in the USA), they determined the self-knowledge of the disease they were suffering from, and it was detected that 73% of the patients in Brazil and 96% in the USA knew what type of disease they had [21 – 24].

However, 56% and 45.3% of each center, respectively, did not know the definition of glaucoma; in addition, 36% and 9%, respectively, did not know that glaucoma could cause blindness [14,17,25]. These figures showed differences between the two populations studied, which are attributed to discrepancies in educational level [26].

## 2. Patients and Methods

The study employed a cross-sectional design to evaluate the clinical outcomes of Iraqi patients with glaucoma. A total of 87 patients aged between 30 and 60 years were recruited from different hospitals across Iraq, spanning from February 2023 to April 2024. Comprehensive demographic and clinical data were collected, including age, gender, body mass index (BMI), smoking status, comorbidities, and educational and economic status. Patients with severe diseases such as cancer or respiratory distress were excluded, while those with previous surgeries, obesity, diabetes, and hypertension were included. The clinical assessment involved detailed ophthalmological examinations to determine visual acuity, intraocular pressure (IOP), and visual field defects. Intraocular pressure was measured and classified into mild (22-30 mmHg), moderate (30-40 mmHg), and severe (>40 mmHg).

Visual acuity was assessed using the best-corrected visual acuity (LogMAR) for both the better and worse eyes. The visual field was evaluated to identify the extent of visual field defects, categorized as mild, moderate, or severe. Additionally, the study utilized the Glaucoma Quality of Life Questionnaire-15 (GQL-15) to measure the impact of glaucoma on patients' quality of life, encompassing aspects such as visual symptoms, daily activities, social interactions, and emotional well-being. Data were analyzed using SPSS version 22, with visual acuity and quality of life scores being key outcomes. This methodology allowed for a comprehensive evaluation of both the clinical and quality of life aspects of glaucoma in the patient population, providing valuable insights into the severity and impact of the disease.

## 3. Results

**Table 1.** Enroll clinical and basic features relate to patients with glaucoma

Features	Number of patients [n = 87]	Percentage [%]
<b>Age</b>		
30 – 39	20	22.99%
40 – 49	32	36.78%

50 – 60	35	40.23%
<b>Sex</b>		
Female	34	39.08%
Male	53	60.92%
<b>BMI, Kg/m2</b>		
< 24.4	21	24.14%
24.4 – 30.6	46	52.87%
> 30.6	20	22.99%
<b>Smoking status</b>		
Smokers	37	42.53%
Non – smokers	50	57.47%
<b>Comorbidities</b>		
Yes	27	31.03
No	60	68.97
Hypertension	20	22.99%
Obesity	26	29.89%
Diabetes	23	26.44%
Anemia	5	5.75%
Kidney diseases	3	3.45%
Asthma	2	2.30%
<b>ASA, %</b>		
I	18	20.69%

II	24	27.59%
III	30	34.48%
IV	15	17.24%
<b>Education status</b>		
Primary school	11	12.64%
Secondary school	14	16.09%
College/university	25	28.74%
Post – graduated	37	42.53%
<b>Working status</b>		
Workers	30	34.48%
Nonworkers	57	65.52%
<b>Monthly income, \$</b>		
< 720	47	54.02%
720 – 940	30	34.48%
> 940	10	11.49%

**Table 2.** Determine the clinical examination related to patients with glaucoma

<b>Variables</b>	<b>Number of patients [n = 87]</b>	<b>Percentage [%]</b>
<b>Symptoms</b>		
Blurry vision	22	25.29%
Eye pain	18	20.69%
Redness in the eye	24	27.59%
Seeing halos around lights	14	16.09%

Tunnel vision	9	10.34%
<b>Other factors</b>		
<b>History of the condition</b>		
Yes	32	36.78%
No	55	63.22%
<b>Medication use</b>		
Yes	40	45.98%
No	47	54.02%
<b>Previous surgeries</b>		
Yes	21	24.14%
No	66	75.86%

**Table 3.** Measurements of visual acuity of patients with glaucoma

Variables	Number of patients [N = 87]	Percentage [%]
<b>Intraocular pressure (IOP)</b>		
Mild [22-30 mmHg]	14	16.09%
Moderate [30-40 mmHg]	32	36.78%
Severe [>40 mmHg]	41	47.13%
<b>Severity of Visual Field Defect (VFD)</b>		
Mild	24	27.59%
Moderate	30	34.48%
Severe	33	37.93%
Best corrected visual acuity (better eye, LogMAR)	0.31 ± 0.24	

Best corrected visual acuity (worse eye, LogMAR)	0.34 ± 0.47	
<b>Diagnosis</b>		
<b>Better eye</b>		
Ocular hypertension (OHT)	22	25.29%
Mild open-angle glaucoma	45	51.72%
Moderate open-angle glaucoma	8	9.20%
Severe open-angle glaucoma	12	13.79%
<b>Worse eye</b>		
Ocular hypertension (OHT)	7	8.05%
Mild open-angle glaucoma	32	36.78%
Moderate open-angle glaucoma	18	20.69%
Severe open-angle glaucoma	30	34.48%
<b>Visual Field Mean Deviation (dB)</b>		
Better eye	- 33.14 to 1.46	
Worse eye	- 36.26 to - 0.38	

**Table 4.** Determine adverse outcomes of patients with glaucoma

Parameters	Number of patients [N = 87]	Percentage [%]
Vision loss	9	10.34%
Blind spots in the field of vision	11	12.64%
Difficulty driving or reading	14	16.09%
Permanent vision damage	6	6.90%

Total	40	45.98%
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**Table 5.** Assessment of quality of life of patients with glaucoma using Quality of Life-15 (GQL-15) questionnaire

GQL-15 questionnaire	Scores
Visual symptoms	56.34 ± 12.47
Daily activities	60.48 ± 8.14
Social interactions	62.55 ± 7.13
Emotional well-being	65.61 ± 9.66

#### 4. Discussion

American study shown that patients who suffer from glaucoma have their day-to-day living, life quality, and vision capabilities significantly affected. It has been demonstrated in scientific research that this eye disease has far-reaching negative effects on one's ability to read and drive, among other things done daily, owing to diminished visual acuity/ field loss as well as contrast sensitivity reduction [27].

Glaucoma is linked to changes in different areas of eye movement, like slow eye movements, smaller eye movements and moveable distance, and helpless eye stabilization, that can worsen as the disease progresses [28].

Moreover, visual field depression and patients' own understanding of the disease play vital roles in determining its effects on an individual's lifestyle in addition to how patients perceive its development as well as treat it [29].

Comprehensive care and improved results for individuals suffering from glaucoma should consider the roles that low vision services play in routine care patients' subjective experiences [30].

Another study found that glaucoma is a slow-progressing disease that affects eyesight, and as it advances, it causes a gradual decline in the ability to see. It is more evident that the sickness mainly influences on the side vision, but it can as well result into disadvantages in mid-sight, especially when dealing with spatial frequencies [31].

Glaucoma impairs various activities that are important in everyday life, such as driving and reading, with reduced contrast sensitivity, visual field loss, and low visual acuity [32]. Furthermore, in early-stage patients, there is compensatory reliance on predictive mechanisms that weaken as the disease advances, and this affects their spatial frequency processing capacity leading to more functional impairment on visually guided activities as severity increases [33]. In addition to causing permanent loss of eyesight, glaucoma seriously affects patients' lives by causing psychological shock and instilling fear, tension, and depression, hence the necessity of comprehensive care encompassing physical and emotional health [33].

The first signs of glaucoma are changes in how the brain cells on the center of your eyes and decreasing layers in the inner part thin as well as diminished activity present in the eye vision area even though this is not yet too clear as loss of sight has not been observed [34].

There are variations in the neuro-glial-vascular changes that are related to the increase in progression in Glaucoma, like the concomitant of RGC degeneration and elevation of intraocular pressure (IOP), alterations in the vascular structure, and activation of Müller cell before IOP elevation, showing that Glaucoma is a disease with many causes [35].

Moreover, early stages of glaucoma cause changes in the brain's structure and function, which in turn affect the white matter pathway, inter-connectivity of various brain regions as well as coordination between what one sees and how they moves, hence sometimes leading to poor posture where there is danger of falling [36].

Moreover, primary open-angle glaucoma (POAG) is affected a lot by other collaborators like age, arterial hypertension, diabetes, and intraocular hypertension. Secondary factors consist of hypertension, diabetes mellitus, myopia, sleep apnea, migraine, family history of glaucoma, and corticosteroid therapy, among others [37].

Depression among glaucoma patients is also attributed to psychological factors such as low economic status, poor health, cardiovascular diseases, history of surgeries, or non-beneficial lifestyle habits like coffee consumption [38].

There are pharmacological interventions for preventing glaucoma, that a Mendelian randomization study shows a causal relationship between type 2 diabetes, systolic blood pressure, fasting glucose, HbA1c, and the risk of developing glaucoma [39].

## 5. Conclusion

The study's findings highlight significant visual impairment and a notable reduction in quality of life among Iraqi patients with glaucoma, particularly those aged 50-60 years. Visual acuity assessments revealed that the best-corrected visual acuity (better eye LogMAR) was  $0.31 \pm 0.24$ , while the worse eye LogMAR was  $0.34 \pm 0.47$ , with visual field mean deviations ranging from -33.14 to 1.46 for the better eye and -36.26 to -0.38 for the worse eye. The Glaucoma Quality of Life Questionnaire-15 (GQL-15) indicated substantial impacts on visual symptoms, daily activities, social interactions, and emotional well-being. These results underscore the critical need for enhanced educational and therapeutic strategies to manage glaucoma more effectively, thereby improving patients' quality of life and maintaining their independence. The study's implications suggest that future research should focus on developing comprehensive care models that integrate both clinical management and patient education to address the multifaceted challenges posed by glaucoma.

## REFERENCES

- [1] F. A. Medeiros, C. P. Gracitelli, E. R. Boer, R. N. Weinreb, L. M. Zangwill, and P. N. Rosen, "Longitudinal Changes in Quality of Life and Rates of Progressive Visual Field Loss in Glaucoma Patients," *Ophthalmology*, vol. 122, pp. 293-301, 2015.
- [2] R. Varma, P. P. Lee, I. Goldberg, and S. Kotak, "An Assessment of the Health and Economic Burdens of Glaucoma," *Am. J. Ophthalmol.*, vol. 152, pp. 515-522, 2011.
- [3] J. P. Nordmann, N. Auzanneau, S. Ricard, and G. Berdeaux, "Vision-Related Quality of Life and Topical Glaucoma Treatment Side Effects," *Health Qual. Life Outcomes*, vol. 1, p. 75, 2003.
- [4] P. Ramulu, "Glaucoma and Disability: Which Tasks Are Affected, and at What Stage of Disease?" *Curr. Opin. Ophthalmol.*, vol. 20, pp. 92-98, 2009.
- [5] K. A. Turano, A. T. Broman, K. Bandeen-Roche, B. Munoz, G. S. Rubin, and S. West, "Association of Visual Field Loss and Mobility Performance in Older Adults: Salisbury Eye Evaluation Study," *Optom. Vis. Sci.*, vol. 81, pp. 298-307, 2004.



- [6] S. W. van Landingham, C. Hochberg, R. W. Massof, E. Chan, D. S. Friedman, and P. Y. Ramulu, "Driving Patterns in Older Adults with Glaucoma," *BMC Ophthalmol.*, vol. 13, p. 4, 2013.
- [7] S. A. Haymes, R. P. Leblanc, M. T. Nicoleta, L. A. Chiasson, and B. C. Chauhan, "Risk of Falls and Motor Vehicle Collisions in Glaucoma," *Invest. Ophthalmol. Vis. Sci.*, vol. 48, pp. 1149–1155, 2007.
- [8] S. E. Skalicky et al., "Activity Limitation in Glaucoma: Objective Assessment by the Cambridge Glaucoma Visual Function Test," *Invest. Ophthalmol. Vis. Sci.*, vol. 57, pp. 6158–6166, 2016.
- [9] H. A. Quigley and A. T. Broman, "The Number of People with Glaucoma Worldwide in 2010 and 2020," *Br. J. Ophthalmol.*, vol. 90, pp. 262–267, 2006.
- [10] G. Gazzard et al., "Selective Laser Trabeculoplasty Versus Eye Drops for First-Line Treatment of Ocular Hypertension and Glaucoma (LiGHT): A Multicentre Randomised Controlled Trial," *Lancet (Lond, Engl)*, vol. 393, pp. 1505–1516, 2019.
- [11] A. J. King et al., "Primary Trabeculectomy for Advanced Glaucoma: Pragmatic Multicentre Randomised Controlled Trial (TAGS)," *BMJ*, vol. 373, p. n1014, 2021.
- [12] A. Rabiolo, K. Barton, and A. I. McNaught, "Patient-Reported Outcome Measures Should Not Be the Primary Outcome in Glaucoma Clinical Trials of Disease Modification," *Br. J. Ophthalmol.*, vol. 107, pp. 3–5, 2023.
- [13] L. Jones, D. F. Garway-Heath, A. Azuara-Blanco, and D. P. Crabb, "Are Patient Self-Reported Outcome Measures Sensitive Enough to Be Used as Endpoints in Clinical Trials? Evidence from the United Kingdom Glaucoma Treatment Study," *Ophthalmology*, vol. 126, pp. 682–689, 2019.
- [14] EuroQol Group, "EuroQol-A New Facility for the Measurement of Health-Related Quality of Life," *Health Policy*, vol. 16, pp. 199–208, 1990.
- [15] C. M. Mangione et al., "Development of the 25-Item National Eye Institute Visual Function Questionnaire," *Arch. Ophthalmol. (Chic, Ill: 1960)*, vol. 119, pp. 1050–1058, 2001.
- [16] B. B. Kulkarni, P. Leighton, and A. J. King, "Exploring Patients' Expectations and Preferences of Glaucoma Surgery Outcomes to Facilitate Healthcare Delivery and Inform Future Glaucoma Research," *Br. J. Ophthalmol.*, vol. 103, pp. 1850–1855, 2019.
- [17] J. T. Le, K. Mohanty, A. K. Bicket, M. E. Tarver, M. B. Eydelman, and T. Li, "Identifying Outcomes That Are Important to Patients with Ocular Hypertension or Primary Open-Angle Glaucoma: A Qualitative Interview Study," *Ophthalmol. Glaucoma*, vol. 2, pp. 374–382, 2019.
- [18] A. K. Bicket, J. T. Le, C. Yorkgitis, and T. Li, "Priorities and Treatment Preferences Among Surgery-Naive Patients with Moderate to Severe Open-Angle Glaucoma," *Ophthalmol. Glaucoma*, vol. 3, pp. 377–383, 2020.
- [19] B. C. Stagg, A. Granger, T. C. Guetterman, R. Hess, and P. P. Lee, "The Burden of Caring for and Treating Glaucoma: The Patient Perspective," *Ophthalmol. Glaucoma*, vol. 5, pp. 32–39, 2022.
- [20] A. Tong, P. Sainsbury, and J. Craig, "Consolidated Criteria for Reporting Qualitative Research (COREQ): A 32-Item Checklist for Interviews and Focus Groups," *Int. J. Qual. Health Care*, vol. 19, pp. 349–357, 2007.
- [21] C. Hirneiss, "The Impact of a Better-Seeing Eye and a Worse-Seeing Eye on Vision-Related Quality of Life," *Clin. Ophthalmol.*, vol. 8, pp. 1703–1709, 2014.
- [22] E. A. Hodapp, R. K. Parrish, and D. R. Anderson, *Clinical Decisions in Glaucoma*. St Louis, USA: Mosby, 1993.
- [23] R. Asaoka, D. P. Crabb, T. Yamashita, R. A. Russell, Y. X. Wang, and D. F. Garway-Heath, "Patients Have Two Eyes! Binocular Versus Better Eye Visual Field Indices," *Invest. Ophthalmol. Vis. Sci.*, vol. 52, pp. 7007–7011, 2011.
- [24] N. Mays and C. Pope, *Qualitative Research in Health Care*, 4th ed. Wiley-Blackwell, 2020, pp. 211–233.
- [25] European Glaucoma Society, *Terminology and Guidelines for Glaucoma*, 5th ed., 2020. [Online]. Available: <https://www.eugs.org/eng/guidelines.asp>
- [26] M. Dempster, N. K. McCorry, M. Donnelly, K. Barton, and A. Azuara-Blanco, "Individualisation of Glaucoma Quality of Life Measures: A Way Forward?" *Br. J. Ophthalmol.*, vol. 103, pp. 293–295, 2019.
- [27] J. T. Le et al., "Prioritizing Outcome Preferences in Patients with Ocular Hypertension and Open-Angle Glaucoma Using Best-Worst Scaling," *Ophthalmol. Glaucoma*, vol. 2, pp. 367–373, 2019.
- [28] T. Li et al., "Patient-Reported Outcomes Measures and Patient Preferences for Minimally Invasive Glaucoma Surgical Devices," *Eye (Lond)*, vol. 34, pp. 205–210, 2020.
- [29] M. Okamoto et al., "Impact of Better and Worse Eye Damage on Quality of Life in Advanced Glaucoma," *Sci. Rep.*, vol. 4, p. 4144, 2014.

- [30] S. Nickels et al., "Vision-Related Quality of Life Considering Both Eyes: Results from the German Population-Based Gutenberg Health Study (GHS)," *Health Qual. Life Outcomes*, vol. 17, p. 98, 2019.
- [31] I. T. Coyne, "Sampling in Qualitative Research. Purposeful and Theoretical Sampling; Merging or Clear Boundaries?" *J. Adv. Nurs.*, vol. 26, pp. 623–630, 1997.
- [32] L. Quaranta, I. Riva, C. Gerardi, F. Oddone, I. Floriani, and A. G. Konstas, "Quality of Life in Glaucoma: A Review of the Literature," *Adv. Ther.*, vol. 33, pp. 959–981, 2016.
- [33] J. Lacey, H. Cate, and D. Broadway, "Barriers to Adherence with Glaucoma Medications: A Qualitative Research Study," *Eye (Lond)*, vol. 23, pp. 924–932, 2009.
- [34] L. Jones, D. J. Taylor, F. Sii, I. Masood, D. P. Crabb, and P. Shah, "Only Eye Study 2 (OnES 2): 'Am I Going to Be Able to See When the Patch Comes Off?' A Qualitative Study of Patient Experiences of Undergoing High-Stakes Only Eye Surgery," *BMJ Open*, vol. 10, p. e038916, 2020.
- [35] L. Bonomi et al., "Vascular Risk Factors for Primary Open-Angle Glaucoma: The Egna–Neumarkt Study," *Ophthalmology*, vol. 107, no. 7, pp. 1287–1293, 2000.
- [36] N. Orzalesi, L. Rossetti, and S. Omboni, "Vascular Risk Factors in Glaucoma: The Results of a National Survey," *Graefes Arch. Clin. Exp. Ophthalmol.*, vol. 245, no. 6, pp. 795–802, 2007. doi: <https://doi.org/10.1007/s00417-006-0457-5>
- [37] R. Varma et al., "Four-Year Incidence of Open-Angle Glaucoma and Ocular Hypertension: The Los Angeles Latino Eye Study," *Am. J. Ophthalmol.*, vol. 154, no. 2, pp. 315–325.e1, 2012. doi: <https://doi.org/10.1016/j.ajo.2012.02.014>
- [38] A. Khatri, J. K. Shrestha, M. Thapa, B. K. Khatri, and M. Kharel, "Severity of Primary Open-Angle Glaucoma in Patients with Hypertension and Diabetes," *Diabetes Metab. Syndr. Obes.*, vol. 11, pp. 209–215, 2018.
- [39] P. Garg, L. Singh, R. Malhotra, and M. Lisa, "A Study on Systemic Risk Factors for Primary Open-Angle Glaucoma," *Int. J. Life Sci. Pharma Rev.*, vol. 4, no. 2, ISSN 2250-0480, 2014.