



BACKGROUND

Glaucoma is a cluster of eye conditions that can lead to visual impairment and vision loss due to damage to the optical nerve. Both disease and its management can significantly affect a patient's health-related quality of life (HRQoL). The specific impact of visual disturbance on HRQoL in individuals with glaucoma remains unclear.

OBJECTIVE

The study aims to investigate the real-world health burdens experienced by health burden experienced by glaucoma patients with and without visual disturbance through a comparative analysis of HRQoL between these two groups.

METHODS

Data Source / Study Population

This retrospective, cross-sectional study included adults diagnosed with glaucoma from the US 2017-2021 Medical Expenditure Panel Survey (MEPS). Adults (≥ 18 years) with glaucoma were identified using the International Classification of Diseases (ICD-10, H40) codes.

Outcomes

The visual impairment variable measured serious difficulty in seeing even with glasses (Yes/No). The HRQoL was evaluated using Physical Component Summary (PCS) and Mental Component Summary (MCS) scores based on the Short Form Health Survey (SF-12).

Statistical Analysis

Demographic differences between patients with and without visual disturbance were tested for significance using Categorical variables. They were compared with Rao-Scott χ^2 tests for categorical variables and t-tests for continuous variables.

The linear regression model was used to measure the association of visual impairment with HRQoL, adjusting for covariates based on the conceptual framework of the Wilson and Clary model. The Elixhauser comorbidity index score was used to control for other comorbid conditions.

Analyses were conducted using SAS 9.4 and SAS survey procedures (i.e., SURVEYFREQ, SURVEYLOGISTIC, SURVEYREG) to provide nationally representative estimates. All comparisons were performed using a 2-tailed alpha level of 0.05.

RESULTS

Table 1. Demographic characteristics of patients with glaucoma

Variables	Categories	Glaucoma with Visual Disturbance			Glaucoma Without Visual Disturbance			P-value
		Unweighted Frequency (N = 277)	Weighted Frequency (N = 2,729,810)	%	Unweighted Frequency (N = 1,886)	Weighted Frequency (N = 21,737,803)	%	
Age, years	18-64	75	633,777	27.28	469	5,196,906	27.00	<.0001*
	65-74	70	521,807	22.46	637	6,320,619	32.83	
	75-84	72	602,656	25.94	565	5,587,615	29.03	
	85+	60	564,823	24.31	215	2,145,173	11.14	
Sex	Male	135	1,202,002	44.03	894	9,438,540	43.42	0.89
	Female	190	1,527,808	55.97	1,237	12,299,263	56.58	
Race / Ethnicity	Hispanic	56	389,693	14.28	236	2,109,501	9.79	0.061
	White	158	1,523,433	55.81	1,286	14,585,028	67.72	
	Black	91	553,384	20.27	474	3,561,521	16.54	
	Others	20	263,300	9.65	135	1,281,753	5.95	
Region	Northeast	57	569,481	20.86	476	4,765,026	21.97	0.27
	Midwest	70	599,811	21.97	479	5,204,960	24.00	
	South	140	1,134,229	41.55	755	7,444,891	34.33	
	West	57	414,370	15.18	419	4,273,281	19.70	
Education	Less than high school	83	600,970	22.02	265	1,921,308	8.86	<.0001*
	High school /GED	148	1,261,778	46.22	907	9,128,390	42.11	
	Associates/Bachelor	30	275,780	10.1	380	4,522,721	20.86	
	Masters or higher	63	588,083	21.54	566	6,107,606	28.17	
Income category	Poor or near poor	116	770,587	28.23	396	2,743,995	12.62	<.0001*
	Low income	67	615,067	22.53	286	2,755,876	12.68	
	Middle income	82	701,737	25.71	566	5,515,217	25.37	
	High income	60	642,420	23.53	883	10,722,715	49.33	
Marital status	Married	117	1,010,405	37.01	1,064	12,006,823	55.23	<.0001*
	Widowed	98	874,065	32.02	431	4,041,595	18.59	
	Divorced	55	490,521	17.97	345	3,204,755	14.74	
	Separated	12	88,189	3.23	50	292,385	1.35	
	Never married	42	254,712	9.33	238	2,135,402	9.82	
Insurance type	Others	1	11,919	0.44	3	56,843	0.26	<.0001*
	Any Private	101	978,574	35.85	1,092	12,487,315	57.45	
	Public Only	223	1,741,769	63.81	1,026	9,145,496	42.07	
	Uninsured	1	9,466	0.35	13	104,992	0.48	
Elixhauser Comorbidities	0	46	384,365	14.08	369	4,172,583	19.20	<.0001*
	1	50	443,358	16.24	543	5,742,264	26.42	
	2	64	526,527	19.29	399	3,944,046	18.14	
	3	60	462,465	16.94	351	3,433,051	15.79	
	4	53	458,601	16.8	233	2,377,077	10.94	
Year	5+	52	454,493	16.65	236	2,068,783	9.52	0.88
	2017	56	436,937	17.61	396	4,153,923	19.25	
	2018	62	548,177	20.85	393	3,948,270	18.30	
	2019	53	515,181	20.98	401	4,163,630	19.30	
	2020	48	418,838	21.16	333	3,588,355	16.63	
2021	58	403,930	19.4	363	3,396,135	15.74		

*P < 0.05, with versus without visual disturbance.

Table 2. Health-Related Quality of Life Using SF-12 Mental and Physical Component Scores*

SF-12 component	Glaucoma with Visual Disturbance (N=277)	Glaucoma without Visual Disturbance (N=1,886)	Difference	P-value
Mental component score, Mean (95% CI)	34.19 (32.48 – 25.90)	44.10 (43.29 – 44.91)	9.91 (8.01 – 11.80)	<0.0001
Physical component score, Mean (95% CI)	47.00 (45.16 – 48.85)	53.05 (52.52 – 53.58)	6.10 (4.10 – 8.00)	<0.0001

*Adjusting for age, sex, race, education, income, insurance type, region, marital status, year, and Elixhauser comorbidities.
CI = confidence interval; SF-12 = 12-item short form

- Among adult glaucoma patients, patients with visual disturbance consisted of 277 unweighted adults, representing 2.32 million (95% CI 9.16-12.38), and those without visual disturbance consisted of 1,886 unweighted adults, representing 19.25 million (95% CI 87.62-90.84) US civilians.
- Most of the glaucoma patients were female (57.59%), between 65-74 years of age (31.71%), and non-Hispanic Whites (67.65%). Among the glaucoma patients, 10.77% (95% CI: 9.15 – 12.38) had visual impairment.
- After adjusting for individual characteristics, glaucoma patients with visual impairment had 9.91 (95% CI: 8.01 – 11.80) lower PCS scores than those without visual impairment. The MCS scores were 6.10 (95% CI: 4.10 – 8.00) units lower among those with visual impairment than those without.

CONCLUSIONS

Visual impairment is a major determinant of HRQoL in persons with glaucoma. Our findings suggest that not only the physical aspects of HRQoL are affected, but also mental aspects due to visual impairment. More work is needed to understand the role of treatment and surgeries in mitigating glaucoma and improving HRQoL. Several limitations are worth noting: the diagnostic codes used for glaucoma identification may not encompass all the diverse forms of the condition. Furthermore, the binary classification of visual impairment may oversimplify its multifaceted nature, thereby restricting the comprehensive assessment of its impact on HRQoL.

REFERENCES

- Common Eye Disorders and Diseases. (2022). Centers for Disease Control and Prevention. <https://www.cdc.gov/visionhealth/basics/ced/index.html>. (last accessed December 22, 2023)
- Research, A. f. H., & Quality. (2021). Elixhauser Comorbidity Software Refined for ICD-10-CM. In: Agency for Healthcare Research and Quality.
- Li, J., Zakeri, M., Hutton, G. J., & Aparasu, R. R. (2022). Health-related quality of life of patients with multiple sclerosis: Analysis of ten years of national data. Multiple Sclerosis and Related Disorders, 66, 104019.
- Serbin, M., Devine, B., Campbell, J., & Basu, A. (2020). Assessing health care burden in glaucoma patients with and without physical or mental comorbidities. Journal of Managed Care & Specialty Pharmacy, 26(3), 325-331