

Psychometric Impact of Diabetic Retinopathy-Induced Visual Impairment: A Hospital-Based Study, Al Buraimi, Sultanate of Oman

Gopi Suresh Vankudre¹, Zoelfigaf Dafalla Mohamed¹, Janitha Plackal Ayyappan¹, Saif Hassan Alrasheed²

¹Department of Optometry, College of Health Sciences, University of Buraimi, Al Buraimi, Sultanate of Oman; ²Department of Optometry, College of Applied Medical Sciences, Qassim University, Buraydah, Saudi Arabia

Correspondence: Zoelfigaf Dafalla Mohamed, Email abumihad2010@gmail.com

Background: Diabetic retinopathy (DR) posed an adverse psychological impact among affected individuals.

Aim: This study evaluates the psychometric impact of Diabetic Retinopathy-induced visual impairment: A hospital-based study, Al Buraimi, Sultanate of Oman.

Settings: A hospital-based population having Diabetic Retinopathy, Al Buraimi, Sultanate of Oman.

Methods: This cross-sectional, hospital-based study included 218 participants having diabetic retinopathy. The Vision Quality of Life Index (VisQoL) utility questionnaire was used to measure the psychometric status. Ordinal logistic regression analyses evaluated the significant factors from age, gender, visual acuity, duration of DM or DR, responsible for the psychometric status.

Results: Of the 218 participants, 114 (52.29%) were males and 104 (47.71%) were females. The mean diabetes mellitus (DM) and diabetic retinopathy duration was 17.21 ± 6.97 years and 5.15 ± 3.51 years respectively. The mean psychometric score was 2.21 ± 1.03 . One-third (34.86%), 2.75% of the participants were extremely concerned, while 33.94% were observed to have a little concern. Visual impairment status ($p = 0.00$), higher age ($p = 0.00$), DR severity ($p = 0.00$) and individuals lacking support of the life partner ($p = 0.00$) were observed to have a significant negative psychometric impact.

Conclusion: Majority of the participants had proliferative diabetic retinopathy. A majority of the (34.86%) reported no concern, and a notable percentage (65.14%) expressed a minor-to-severe level of concern. Age, marital status, severity of diabetic retinopathy and level of visual impairment were the significant predictors for their psychometric scores.

Keywords: diabetes mellitus, diabetic retinopathy, quality of life, public health, psychological status

Introduction

The metabolic and chronic disorder of diabetes mellitus (DM) is also associated with the ocular complication of diabetic retinopathy (DR) – a leading blinding condition among working professionals.¹ Vision is an integral part of individual's daily routine² and impaired visual status due to DR is known to have an adverse psychological and social impact.³ Visual impairment due to diabetic retinopathy can often lead to anxiety, depression or social isolation.⁴ Such negative mental responses can further complicate the disease management and the overall life quality of the affected individuals.^{5,6}

The DM prevalence in the Middle east region is on rise.^{7,8} Similar prevalence rise is also observed within the sultanate of Oman.⁹ Due to this increase in DM prevalence, most of the DM population is at risk of developing DR. A systematic review observed the DR prevalence of 20.5% among the Gulf regions¹⁰ which is higher than a study done in Omani population having a DR prevalence of 19.3%. Considering such an alarming prevalence rate, it is essential to focus on psychological aspects of the affected community.

Diabetes mellitus is known to cause distress and depression among the affected population.¹¹ Similarly, despite advances in DR treatment the DR associated mental and lifestyle risk management has not received the needed attention. Also, there are limited studies measuring the psychometric impact of the diabetic retinopathy, among the Omani population. A study conducted in United States, observed that the affected population is at the risk of falling into addiction, sleep deprivation, reduced physical activity and suffering from depression.¹ Also, a study involving the European population observed bipolar disorder among DR population.¹² The regional evidence evaluating the psychological status of the population having diabetic retinopathy is essential to integrate the appropriate measures and positive health outcomes. Moreover, disease severity such as, severe non proliferative DR And proliferative DR are observed to be associated with higher levels of depressive symptoms.⁴ Hence, focusing on early intervention is essential. Previous studies exploring the impact of diabetic duration on the individual's lifestyle found a positive self-management awareness among prediabetic population compared to individuals having longer DM duration and having suffered from depression.¹

Physiological interventions are known to relieve the diabetic distress.^{11,13} Emotional support can be considered as empathy towards affected individuals. It allows the people living with diabetes mellitus to express their fears, obtain positive feedback which is essential to maintain disease related self-compliance.¹¹ Social and family support have known benefits on the physical as well as the mental health among the population affected with diabetes mellitus.¹¹ Diabetic retinopathy is negatively associated with the quality of life of the affected individuals that worsens with severity.¹⁴ Aged population within the Al Buraimi, region of the Sultanate of Oman was observed to be the most significant factor than the DR duration, affecting the quality of life of the individuals.³ Limited research exists measuring the psychological impact across different stages of disease severity.⁴ Moreover, this evidence psychological impact among Omani population is also limited. Hence, the study focuses on evaluating the DR affected individual's psychometric status. The study findings can be essential in guiding and designing the targeted interventions¹⁵ as well as support services for the affected community. This research also underscores the key demographic attributes for condition related psychometric status to be integrated, while integrating psychological and social support services for managing patients with DR.

Research Methods and Design

Study Setting and Population

This cross sectional, hospital-based study psychometric performed psychometric evaluation among patients with diabetic retinopathy, visiting a public ophthalmic facility in the Al Buraimi, Sultanate of Oman between the period of June 2023 till January 2024.³ Considering the sample size used in study conducted for the design and validation of Vision Quality of Life Index (VisQoL) utility questionnaire,¹⁶ a total of 218 with either type 1 or type 2 diabetes were recruited through the consecutive selection process. All the participants aged ≥ 18 years and any level of diabetic retinopathy were given equal chance to participate in the study.³ Population without diabetic retinopathy, any other systemic or ocular co-morbidity were excluded from the study.

Study Instrument

The six item Vision Quality of Life Index (VisQoL) utility tool measuring the psychometric impact of visual loss was used in this study.¹⁶ This established tool having the summative scoring system, forms a simple evaluation instrument to measure the psychometric impact. The six items of "injury/mobility, coping with life demands, ability to have friendship, organizing assistance, fulfilling roles, confidence in joining activities in" measured the condition-related impact on these attributes. Participants' responses psychometric were collected using a 5-point Likert scale (1 = not concerned and 5 = very severe concern). The psychometric score is analyzed for each participant as the mean scores of these items. These mean scores are further distributed to categorize the psychometric level of the participant. The mean between "1.00 and 1.80" were categorized as no concern, "1.81–2.60" as little; "2.61–3.40" as moderate, "3.41–4.20" as severe and "4.21–5.00" were categorized as very severe.

Data Collection

Participants' eligibility criteria were assessed from the case records during their visit to the facility. Eligible participants were provided with a participant information sheet and informed consent was obtained from each participant.³ All the eligible participants agreed to participate and completed the self-administered, six item questionnaire focusing on the psychometric properties,¹⁶ using hard copies during the visit to the facility prior to their consultation with the eye care practitioner.

The first part of the questionnaire collected responses on demographic information, such as gender, age, marital status, and nationality of the participants.

The responses were also collected for the patients' diabetes mellitus and diabetic retinopathy profiles through their case records to obtain participant's type of diabetes mellitus and diabetic retinopathy; duration of diabetes mellitus and diabetic retinopathy. The type diabetic retinopathy were classified as per World Health Organization's International Classification of Diseases (ICD-10), under four categories, as mild, moderate or severe non proliferative and proliferative diabetic retinopathy.³

The best corrected Snellen's visual acuity in both eyes, noted in the case records was converted into decimal visual acuity. The classification of the visual acuity was done as per the guidelines of World Health Organization's International Classification of Diseases (ICD-11)¹⁷ The best corrected visual acuity in the better eye of less than 3/60 (decimal acuity = 0.05), less than 6/60 (decimal acuity = 0.10) to 3/60, less than 3/18 (decimal acuity = 0.17) to 6/60 and less than 6/12 (decimal acuity = 0.5) to 6/18 were categorized as blindness, severe, moderate and mild visual impairment respectively.¹⁷ The mean psychometric score was compared with the participant's visual acuity with both eyes.

Data Analysis

The IBM Statistical Package for Social Sciences version 26 was used to perform statistical analysis. Descriptive statistics were used to analyze participant's age, DM and DR duration, decimal visual acuity scores and psychometric scores. The Pearson correlation test was used to determine the correlation between the psychometric score and the participant attributes of age, visual acuity, duration of diabetes mellitus, and diabetic retinopathy. Ordinal logistic regression analyses was performed to identify the factors having significant psychometric impact among the study variables of age, gender, visual acuity, duration of DM or DR.

Ethical Consideration

The study was approved by the Research and Ethical Committee of the University of Buraimi (No. AY22-23COHS-R11) and Ministry of Health, Al Buraimi Governorate, Research Ethical Review and Approval Committee (No. MoH/CSR/23/26,671) ensuring that the study adhered to ethical guidelines and safeguarded the rights and confidentiality of the participants. It followed the guidelines as per the Declaration of Helsinki (1975). All willing participants provided written informed consent obtained through verbal communication during their visit to the waiting area. Each participant received an information sheet, and consent was obtained. The researcher explained the risks, benefits, study purpose, procedures, confidentiality, and participants' right to withdraw from the study at any time during the study period. The consent form included clear guidelines and expectations for the participants throughout the study period and was signed by the participants following their understanding of the study and their agreement to participate.

Results

Of the 218 participants, 114 (52.29%) were males and 104 (47.71%) were females. The mean age of the participants was 57.49 ± 12.31 years. Of the total 218 participants, 213 (97.71%) were Omani participants and five were non-Omani (2.29%) participants. One hundred and sixty-nine (77.52%) of participants were married whereas 49 (22.48%) were without this assistance.

The mean DM Duration was 17.21 ± 6.97 years. The mean DR Duration of the participants was 5.15 ± 3.51 years. The mean psychometric score was 2.21 ± 1.03 . One hundred and ninety-four (89%) had Type II Diabetes Mellitus. Majority of the participants had proliferative DR ($n = 102$, 46.79%), followed by mild non-proliferative ($n = 60$,

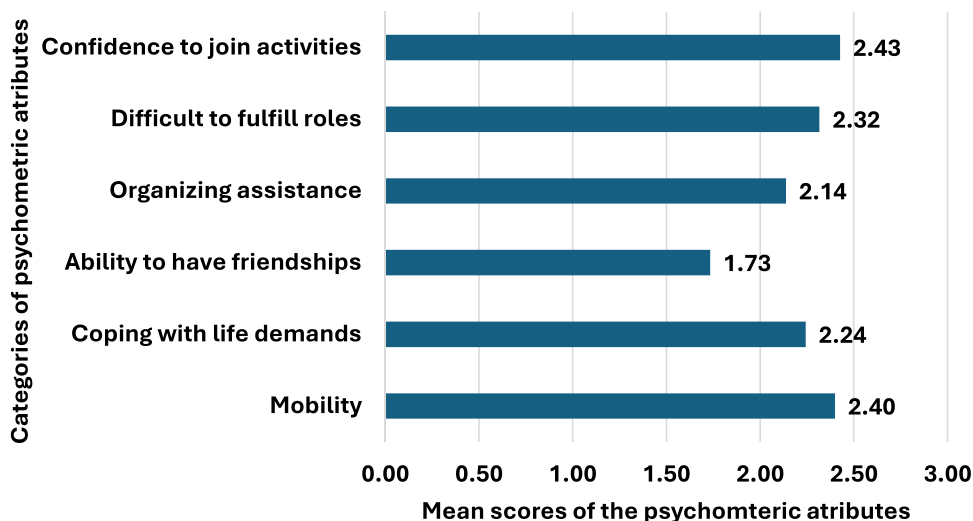


Figure 1 Mean psychometric score of the participants.

27.52%), moderate non-proliferative ($n = 30$, 13.76%), severe non-proliferative ($n = 26$, 11.93%) diabetic retinopathy. 60.09% had no visual impairment, and mild, moderate and severe visual impairment was observed among 26.61%, 3.67% and 5.50%, respectively. 4.13% of the participants were blind.

As per the study defined psychometric classification, no concern in the psychometric attributes of “Ability to Have New Friendship” (1.73 ± 0.96); The little concerns were observed in the psychometric attributes of mobility activities (2.40 ± 1.16), coping with life demands (2.24 ± 1.15), organizing the required assistance (assistance (2.14 ± 1.10), fulfilling roles for family work and community (2.32 ± 1.15), confidence in daily activities (activities (2.43 ± 1.17). The study did not observe any severe psychometric concern (Figure 1).

Categorization of the Participants Based on the Level of Their Psychometric Status

Of the 218 participants, almost one-third (34.86%) had no psychometric impact due to their disease condition. Only 2.75% of the participants were extremely concerned, while 33.94% were observed to have a little concern psychometric (Figure 2).

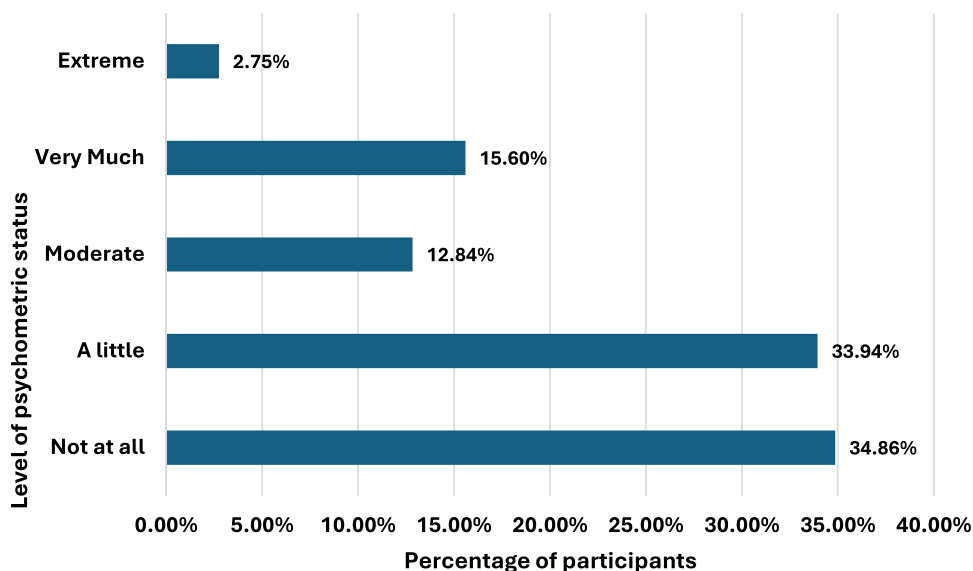


Figure 2 Level of psychometric status among the participants.

Table 1 Correlation Between Psychometric Scores and Visual Status, Age, Diabetes Mellitus and Diabetic Retinopathy Duration

Average_Psychometric_Score		
Attribute	Pearson Correlation	Sig. (2-tailed)
Age	0.340**	0.000
Duration of Diabetes Mellitus	0.119	0.079
Duration of Diabetic Retinopathy	0.117	0.084
Visual Status	0.512**	<0.01

Note: **Correlation is significant at the 0.01 level (2-tailed).

Correlation of the Psychometric Score with Age, DM Duration and DR Duration

The attributes of age and visual status ($p < 0.001$) were significantly correlated with psychometric scores. There was a statistically insignificant correlation between the psychometric score and the DM Duration ($p = 0.08$) and DR Duration ($p = 0.08$) (Table 1).

Psychometric Impact of the Study Variables of Age, Duration of Diabetes Mellitus and Diabetic Retinopathy, Type of Diabetes Mellitus and Diabetic Retinopathy, Gender and Marital Status

Participant's visual impairment status ($p = 0.00$), higher age ($p = 0.00$), severity of diabetic retinopathy ($p = 0.00$) and individuals lacking support of the life partner ($p = 0.00$) were observed to have a significant negative psychometric impact (Table 2).

Table 2 Psychometric Impact Over the Other Confounding Study Variables of Age, Duration of Diabetes Mellitus and Diabetic Retinopathy, Type of Diabetes Mellitus and Diabetic Retinopathy, Gender and Marital Status

Parameter	Number	Percentages	Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
								Lower Bound	Upper Bound
Age	218	100.00%	0.043	0.012	12.334	1	0	0.019	0.067
Diabetes Mellitus Duration	218	100.00%	-0.042	0.022	3.603	1	0.058	-0.086	0.001
Diabetic Retinopathy Duration	218	100.00%	-0.026	0.042	0.391	1	0.532	-0.108	0.056
Gender									
Male	114	52.29%	0.447	0.264	2.866	1	0.09	-0.071	0.965
Female	104	47.71%	0 ^a			0			
Nationality									
Omani	213	97.71%	-0.085	0.82	0.011	1	0.918	-1.693	1.523
Expat	5	2.29%	0 ^a			0			

(Continued)

Table 2 (Continued).

Parameter	Number	Percentages	Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
								Lower Bound	Upper Bound
Diabetes Mellitus Type									
Type 1	24	11.01%	0.459	0.405	1.288	1	0.256	−0.334	1.252
Type 2	194	88.99%	0 ^a			0			
Diabetic Retinopathy Type									
Mild non- proliferative	60	27.52%	−1.764	0.347	25.824	1	0	−2.444	−1.083
Moderate non proliferative	30	13.76%	−1.569	0.393	15.972	1	0	−2.339	−0.8
Severe non proliferative	26	11.93%	−0.722	0.397	3.316	1	0.069	−1.5	0.055
Proliferative	102	46.79%	0 ^a			0			
Marital Status									
Single	49	22.48%	1.091	0.328	11.049	1	0.001	0.448	1.735
Married	169	77.52%	0 ^a			0			
Visual Status									
No visual Impairment	131	60.09%	−4.047	0.734	30.436	1	0	−5.485	−2.609
Mild visual Impairment	58	26.61%	−3.672	0.739	24.696	1	0	−5.12	−2.224
Moderate visual Impairment	8	3.67%	−1.734	0.909	3.642	1	0.056	−3.514	0.047
Severe visual Impairment	12	5.50%	−2.155	0.829	6.762	1	0.009	−3.78	−0.531
Blindness	9	4.13%	0 ^a			0			

Notes: A total of 218 observations are used in the ordinal logistic regression analysis. ^aThis parameter is set to zero and considered as reference.

Discussion

The present study aimed to evaluate the psychometric status of the participants having diabetic retinopathy. The findings provide baseline evidence for understanding the psychosocial aspects of individuals with DR and suggest the potential implications for ophthalmic practice and public health interventions within the Sultanate of Oman. The demographic characteristics mainly reflected the Omani population (97.71%) and minor participation were non-Omani (2.29%) population. The higher percentage of Omani population within the study could be due to the availability of health insurance for nationals in the concerned governmental hospital. The mean age of the participants was relatively high, supporting the hypothesis that DR affects individuals with chronic DM.³ The balanced gender distribution in this study indicates equal susceptibility to DR among both groups.

The findings of this study indicate that participants' psychometric score underscores the variations in the psychological impact due to the severity of DR. Similar negative impact is also observed in the literature.¹¹ Almost one-third (34.86%) of the study population reported no concern, while a notable percentage of responders (31.19%) expressed varying levels with moderate to severe concern. These study findings resonate with previous study findings indicating the complex association between disease severity and their psychological well-being, especially among the affected individuals with chronic conditions such as DM.¹⁴ The DR-related debilitating effects observed in our study are similar to the findings of the systematic review, reflecting reduced efficiency in their family role, work and social isolation.⁶ It is also observed to hamper the individual's independence.⁶ Adverse emotional responses include fear, anxiety, vulnerability, guilt, loss of confidence, anger, stress and self-psychometric issues.⁶ Although previous studies have observed better

disease-related self-care among older groups,¹⁸ our study found a significant negative psychometric status among the aged population. In addition, although our study did not find a significant correlation between the duration, and psychometric score, it was significant with the severity of DR and individuals' Previous studies have also indicated the similar significant correlation.¹⁴

This study found interesting insights into the factors that influence individuals' psychometric status. Assistance of the life partner emerged as a significant predictor ($p < 0.001$) of providing a positive outlook and improving the quality of life. These study outcomes align with existing evidence underscoring the supportive role of familial or social relationships in coping with chronic illnesses and highlighting the significance of integrating family centered interventions in patients with diabetic retinopathy. A similar protective effect on psychological well-being was observed in the married diabetic population.¹⁹ Furthermore, the age of the individual was identified as a significant factor ($p < 0.001$) responsible for their psychometric scores, suggesting that older adults tend to express more concerns due to their impaired visual status. This finding corroborates previous literature indicating that age-related changes accompanied by cumulative disease burden might negatively contribute to worsened anxiety and distress among the older population with diabetic retinopathy.²⁰

This study adds nuance with a specific focus on psychometric status related to visual status among participants having diabetic retinopathy, thereby providing the baseline evidence on psychometric status among diabetic retinopathy population residing in Oman. Though this study observed the associated psychometric factors of due to visual status among diabetic retinopathy population, it does not claim the causality of the involved factors. Moreover, the study poses limitation due to the selective participant recruitment visiting the hospital facility, hence their responses cannot be generalized to the other population such as the population residing in the rural areas or having lack of access to the health care facilities. Our study proposes to conduct similar studies in different provinces and the health care settings within the Sultanate of Oman. To enhance the health outcome among individuals with diabetic retinopathy, the health care professionals and the associated community need to involve in patient care.² This study findings provide baseline evidences on the psychometric status among the Omani residents having DR and suggest customized interventions involving psychological counselling focusing on the condition.

Conclusion

The majority (46.79%) of the participants had proliferative diabetic retinopathy and 89% of the study participants were having Type II Diabetes Mellitus. Most of the study population reported no concern (34.86%), and a notable percentage (65.14%) expressed a minor-to-severe level of concern. Age, assistance of the life partner, severity of diabetic retinopathy and level of visual impairment were found to be significant predictors for their psychometric scores. Similar studies in different provinces and the health care settings, within the Sultanate of Oman can be beneficial to confirm the relationship of the observed associated factors.

Funding

This work was supported by the University of Buraimi, Sultanate of Oman with the research grant (IRG/UoB/CoHS/-004/2022-23).

Disclosure

The authors report no conflicts of interest in this work.

References

1. Li B, Zhou C, Gu C, et al. Modifiable lifestyle, mental health status and diabetic retinopathy in U.S. adults aged 18–64 years with diabetes: a population-based cross-sectional study from NHANES 1999–2018. *BMC Public Health*. 2024;24:11. doi:10.1186/s12889-023-17512-8
2. Fan C, Liu Y, Huai B, et al. Disease perception and experience in people with diabetic retinopathy: a qualitative study. *Nurs Open*. 2023;10:2150–2157. doi:10.1002/nop2.1462
3. Mohamed Z, Vankudre GS, Ayyappan JP, et al. Vision-related quality of life among diabetic retinopathy patients in a hospital-based population in the Sultanate of Oman. *Clin Optom*. 2024;16:123. doi:10.2147/OPTO.S462498

4. Rees G, Xie J, Fenwick EK, et al. Association between diabetes-related eye complications and symptoms of anxiety and depression. *JAMA Ophthalmol.* 2016;134:1007–1014. doi:10.1001/jamaophthalmol.2016.2213
5. Coyne KS, Margolis MK, Kennedy-Martin T, et al. The impact of diabetic retinopathy: perspectives from patient focus groups. *Fam Pract.* 2004;21:447–453. doi:10.1093/fampra/cmh417
6. Fenwick E, Rees G, Pesudovs K, et al. Social and emotional impact of diabetic retinopathy: a review. *Clin Exp Ophthalmol.* 2012;40:27–38. doi:10.1111/j.1442-9071.2011.02599.x
7. Al Busaidi N, Shanmugam P, Manoharan D. Diabetes in the middle east: government health care policies and strategies that address the growing diabetes prevalence in the middle east. *Curr Diab Rep.* 2019;19:1–10. doi:10.1007/s11892-019-1125-6
8. Meo SA, Sheikh SA, Sattar K, et al. Prevalence of type 2 diabetes mellitus among men in the middle east: a retrospective study. *Am J Mens Health.* 2019;13:1557988319848577. doi:10.1177/1557988319848577
9. Moradinazar M, Babakhani M, Rostami R, et al. Epidemiological status of type 2 diabetes mellitus in the Middle East and North Africa, 1990–2019. *East Mediterr Health J.* 2022;28:478–488. doi:10.26719/emhj.22.050
10. Mohamed Z, Al-Natour M, Al Rahbi H. Prevalence of diabetic retinopathy among individuals with diabetes in gulf cooperation council countries: a systematic review and meta-analysis. *Oman Med J.* 2024;39:e585. doi:10.5001/omj.2024.77
11. Cooper BA, Singh RSJ. Emotional support of people with diabetes-related retinopathy. *Compendia.* 2019;2019:16–21. doi:10.2337/db20191-16
12. Chen C, Lan Y, Wang Z, et al. Causal effects of diabetic retinopathy on depression, anxiety and bipolar disorder in the European population: a Mendelian randomization study. *J Endocrinol Invest.* 2024;47:585–592. doi:10.1007/s40618-023-02176-3
13. Zu W, Zhang S, Du L, et al. The effectiveness of psychological interventions on diabetes distress and glycemic level in adults with type 2 diabetes: a systematic review and meta-analysis. *BMC Psychiatry.* 2024;24:660. doi:10.1186/s12888-024-06125-z
14. Zayed MG, Karsan W, Peto T, et al. Diabetic retinopathy and quality of life: a systematic review and meta-analysis. *JAMA Ophthalmol.* 2024;142:199–207. doi:10.1001/jamaophthalmol.2023.6435
15. Vankudre GS. Diabetic retinopathy related health educational intervention—a contextual and evaluation based design. *TEXILA Int J PUBLIC Health.* 2019;7:1–7. doi:10.21522/TIJPH.2013.07.02.Art001
16. Misajon R, Hawthorne G, Richardson J, et al. Vision and quality of life: the development of a utility measure. *Invest Ophthalmol Vis Sci.* 2005;46:4007–4015. doi:10.1167/iovs.04-1389
17. Salowi MA, Naing NN, Mustafa N, et al. Prevalence of visual impairment and its causes in adults aged 50 years and older: estimates from the National Eye Surveys in Malaysia. *PLoS One.* 2024;19:e0299768. doi:10.1371/journal.pone.0299768
18. Albaiomy ME, Bedier NA. Self care practices among patients with diabetic retinopathy. *IOSR-JNHS.* 2019;8:33–43.
19. Soleimani Kamran J, Jafroudi S, KazemNejad Leili E, et al. Quality of life in patients with diabetic retinopathy. *J Holist Nurs Midwifery.* 2017;27:69–77. doi:10.18869/acadpub.hnmj.27.1.69
20. Cameron L, Leventhal EA, Leventhal H. Symptom representations and affect as determinants of care seeking in a community-dwelling, adult sample population. *Health Psychol.* 1993;12:171–179. doi:10.1037/0278-6133.12.3.171

Clinical Optometry

Publish your work in this journal

Clinical Optometry is an international, peer-reviewed, open access journal publishing original research, basic science, clinical and epidemiological studies, reviews and evaluations on clinical optometry. All aspects of patient care are addressed within the journal as well as the practice of optometry including economic and business analyses. Basic and clinical research papers are published that cover all aspects of optics, refraction and its application to the theory and practice of optometry. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/clinical-optometry-journal>

Dovepress
Taylor & Francis Group