



Vision-Related Quality of Life Among Diabetic Retinopathy Patients in a Hospital-Based Population in the Sultanate of Oman

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Background: The global prevalence of diabetic retinopathy (DR) among individuals with diabetes is 22.27%. This highlights the likelihood of developing burden of retinopathy within the at risk population and can have a detrimental impact on an individual's quality of life (QoL). The aim of this study is to assess the vision-related QoL in individuals with (DR) in a hospital-based population in the Al-Buraimi governorate, Sultanate of Oman.

Methods: The study was conducted in the Ophthalmology Outpatient Department of Al Buraimi Hospital and Polyclinic. This study enrolled 218 patients (114 males, 104 females) diagnosed with DR. The NEI-VFQ-25 questionnaire was adopted in this study. The patients were classified into different groups according to their type of diabetes and other relevant demographic information.

Results: A total of 218 patients responded to the NEI-VFQ-25 questionnaire. The mean age of the participants was 57.49 ± 12.3 years, 52.3% were male, and 47.7% were female. The overall QoL score was 41.53 ± 20.8 . Patients aged more than 75 years had the lowest QoL scores compared with the other age groups ($p = 0.02$). The results showed that the duration of diabetes had no significant impact on the overall QoL scores ($p = 0.06$). A higher QoL score was observed among patients with type II diabetes mellitus (DM) than with type I diabetes mellitus ($p = 0.01$). Patients diagnosed with proliferative DR (PDR) had a significantly lower QoL score than those diagnosed at other stages ($p < 0.001$).

Conclusion: The QoL of the population with DR is negatively affected by various factors, including demographics, disease severity, and in patients with DM type II. It is important to consider these factors to enhance QoL in patients with DR. Regular evaluation of an individual's QoL is beneficial for both physicians and healthcare teams.

Keywords: diabetes, diabetic retinopathy, vision-related, quality of life

Introduction

Diabetes mellitus (DM) has arisen as a main public health challenge in the 21st century because of its widespread prevalence worldwide.¹ The International Diabetes Federation (IDF) estimated that in 2021, the global prevalence of DM among individuals aged 20–79 years was 10.5%, which translates to a total of 536.6 million people.² Furthermore, the IDF predicts that this figure will increase to 12.2% by the year 2045, totaling 783.2 million people. DR is a common retinal vascular disorder that inevitably worsens in most patients with DM and frequently results in significant vision impairment.^{3–5} In the initial phase of DR, a few visual symptoms may emerge during non-proliferative stages. However, the disease can progress to more severe stages such as severe non-proliferative DR (NPDR) and proliferative DR (PDR), which can pose a threat to vision. If left untreated, significant vision loss may occur.⁶ After 20 years of living with DM, most patients experience some degree of retinopathy.^{6–8} The global prevalence of DR is 22.27%.⁹ The fact that diabetic retinopathy does not present with symptoms, especially in its earlier stages, it is important to detect it early, it highlights the necessity for a structured approach to screening for DR and a system for follow-up care to avert the potential for new cases of blindness that may result from inadequate management.¹⁰

An individual's QoL can be influenced by the extent of their visual impairment. Patient compliance with treatment and routine follow-up visits can lead to positive visual outcomes. As defined by the World Health Organization, QoL encompasses an individual's subjective perception of their standing in life, considering their cultural and value systems, personal goals, expectations, standards, and concerns.^{11,12} The combination of DR, visual impairment, and patient comorbidities can lead to a substantial decrease in both physical and mental aspects of life.^{13,14} A study conducted in Spain among individuals with type 2 DM revealed that DR had a detrimental effect on QoL.¹⁵ In Sultanate of Oman, the prevalence of DM (14.5%) and consequently the DR (19.2%) are on rise.¹⁶ According to the World Health Organization, in Oman, DM is the sixth main cause of "premature mortality" and the fifth key reason for 'disability-adjusted life years lost.'¹⁷ However, limited evidence is available to reflect vision-related QoL among diabetic patients in the Sultanate of Oman.¹⁸ Due to contextual specificities, such as culture, socio-economic status, geographical location, and individual characteristics, the results of studies conducted elsewhere may not be generalizable to the context of Oman. Additionally, understanding and evaluating the QoL among the affected population is essential for identifying the current gaps, highlighting the key issues, and improving communication between the patient and the eye care practitioner.^{19–21}

Materials and Methods

Study Design and Population

The study was conducted in the outpatient department of Ophthalmology at Al Buraimi Hospital and the Polyclinic, Al Buraimi, Sultanate of Oman, from June 2023 to January 2024. The study protocol was in accordance with the revised ethical principles outlined in the 1975 Declaration of Helsinki. All participants who agreed to take part in this study provided their informed consent. All patients above 18 years of age, with DM type 1 or 2 having DR, and ready to provide informed consent were included. Participants at any stage of DR and duration were given equal opportunity to participate. Patients with Alzheimer's disease, other forms of dementia, or any other major illnesses were excluded. This study was approved by the Research and Ethics Committee of the University of Buraimi (No. AY22-23COHS-R11), and Research Ethical Review and Approval Committee under the Ministry of Health, Al Buraimi Governorate (No. MoH/CSR/23/26,671). Consent was obtained from the patients, and their willingness to participate was confirmed.

Data Collection

Participants' information sheets were provided to the patients, and the purpose, importance, and necessity of the study were explained. Consent was obtained from the patients, and their willingness to participate was confirmed. The investigator completed the case record form by verbally questioning patients and reviewing their case report files. The questionnaire was then administered to patients within the hospital setting prior to their consultation with the eye care practitioner, and any missing data were checked before the questionnaires were collected.

The National Eye Institute Visual Function Questionnaire-25 (NEI-VFQ-25), self-administered questionnaire designed to evaluate vision function in individuals with chronic eye diseases, such as cataracts, keratoconus, glaucoma, and DR was used in this study.¹⁸ The questionnaire assessed the overall vision, health, and impact of visual problems on daily activities. The Arabic version questionnaire was used and obtained responses from the participants.²² The researcher conducted the questionnaire face-to-face with participants in a hospital setting. All items were evaluated and scored according to set guidelines, with a further post-reverse coding score indicating better functioning. Subsequently, each item was transformed into a scale ranging from 0 to 100, where the lowest and highest possible scores were designated 0 and 100 points, respectively. The overall score is the average of the 12 domains.

Statistical Analysis

Data analysis was performed using SPSS version 27.0.1. The data normality was confirmed using the Shapiro–Wilk test with a significance level of $p < 0.05$. Descriptive statistics were used to analyse the data, and the relationships between variables were examined. One-way ANOVA was employed to conduct multiple comparisons, while Pearson's correlation coefficient was determined for all QoL domains of the questionnaire.

Results

A total of 218 individuals with diabetic retinopathy (DR) were included in the study, of which 114 (52.3%) were male and 104 (47.7%) were female. The average age of the participants was 57.49 ± 12.3 years. Most participants had a primary school education or lower, with 116 (53.2%) falling into this category. In addition, 169 participants (77.5%) were married. Type 2 diabetes was present in 194 (90%) of the patients, with an average duration of 17.21 years (6.97 standard deviation). PDR was the most common stage of DR, accounting for 46.8% of the participants. Cataracts were present in 122 participants (56%) (Table 1).

Table 1 Descriptive Characteristics

		Gender		Total (%)
		Male	Female	
Age	25–35 years	6	4	4.58
	36–45 years	14	14	12.8
	46–55 years	29	25	24.7
	56–65 years	39	23	28.44
	66–75 years	20	32	23.85
	76–85 years	4	6	4.58
	More than 85	2	0	0.92
Qualification	Primary school	58	58	53.2
	Secondary school	41	28	31.65
	Graduate	11	11	10.09
	Post-graduate	4	7	5.05
Marital status	Single	5	7	5.50
	Married	103	66	77.52
	Divorced	0	2	0.92
	Widowed	6	29	16.06
DM type	Type 1	16	8	11.00
	Type 2	98	96	89.00
DR Stage	Mild NPDR	28	32	26.6
	Moderate NPDR	16	14	13.76
	Severe NPDR	14	12	11.47
	PDR	56	46	46.78
Duration of DM	1 to 10 years	26	17	19.72
	11 to 20 years	55	54	50.00
	21 to 30 years	30	31	27.97
	31 to 40 years	2	2	1.82
	41 to 50 years	1	0	0.49
Total		114 (52.3%)	104 (47.7%)	218 (100)

NEI-VFQ-25 Scores Among DR Patients

The quality-of-life score for each participant was calculated. The mean (SD) overall score of QoL was 41.53 (20.8). The scores of the general health, vision, and role difficulties domains in the present study were observed to be the lowest compared with other domains, which were 38.07 ± 24.5 and 38.42 ± 25.5 and 37.27 ± 22.7 , respectively. The details of the scores are listed in [Table 2](#).

Factors Associated with QoL Scores Among Patients with DR

The age group of 56–65 years demonstrated the highest Quality of Life score, which was 46.6 ± 21.0 followed by 46–55- and 66–75-years' age groups, with scores of 42.9 ± 20 and 40.15 ± 19.24 , respectively. The 76–85 years' age group had the lowest QoL score which was 31.0 ± 20.8 , and the QoL score for DR decreased with age ($p=0.02$). The results showed that there had a less significant impact on the level of overall DR QoL ($p=0.06$); however, general health, ocular pain, near vision, distant vision, colour vision, and mental health were significantly correlated with DR duration ($p = 0.02, < 0.001, < 0.001, 0.04, \text{ and } 0.02$, respectively). The QoL scores for females and males were evaluated, and it was found that females did not have significantly higher QoL scores (40.44 ± 20.2) compared to males (42.73 ± 21.4) ($p = 0.417$). The marital status of participants was significantly correlated with QoL scores among participants ($p < 0.001$) which was the highest among married patients (44.3 ± 21.15), and qualification was significantly correlated with the overall score ($p = 0.02$), which was higher among postgraduates compared with other levels. QoL scores were calculated for both types of DM. A significant difference was observed between the QoL scores of patients with type I and type II DM, with higher QoL scores among the type II DM population (31.00 ± 17.8 and 42.8 ± 20.9 , respectively) ($p = 0.01$). QoL scores were evaluated based on the DR stage. Patients diagnosed with PDR had a significantly lower score (32.1 ± 16.3) than those with NPDR (51.6 ± 21.5), and the association between the DR type and scores was strongly significant ($p=0.00$) ([Table 3](#)).

Table 2 Quality of Life Scores for the Study Groups

Domains	Overall Mean \pm SD	Male Mean \pm SD	Female Mean \pm SD
General Health	38.07 \pm 24.5	37.06 \pm 23.6	39.18 \pm 25.5
General vision	38.42 \pm 25.5	37.06 \pm 24.3	39.90 \pm 26.9
Ocular pain	38.07 \pm 24.2	37.06 \pm 22.6	39.18 \pm 25.6
Near vision	43.04 \pm 22.4	41.98 \pm 21.1	44.20 \pm 23.7
Distant vision	46.06 \pm 21.9	44.74 \pm 22	47.52 \pm 21.8
Peripheral vision	44.95 \pm 22.6	44.08 \pm 22.4	45.91 \pm 22.9
Social functioning	38.30 \pm 23.7	37.72 \pm 23.8	38.94 \pm 23.6
Color vision	41.74 \pm 24	40.79 \pm 24	42.79 \pm 24.1
Driving	46.39 \pm 21.9	44.52 \pm 22	48.44 \pm 21.7
Role difficulties	37.27 \pm 22.7	36.40 \pm 22.3	38.22 \pm 23.1
Mental health	41.80 \pm 17	40.90 \pm 16.9	42.79 \pm 17.2
Dependency	39.72 \pm 23.4	38.82 \pm 23.4	40.71 \pm 23.4
Overall QoL	41.53 \pm 20.8	40.44 \pm 20.2	42.73 \pm 21.4

Table 3 Significance of the Associated Factors of Diabetic Retinopathy Related Quality-of-Life Score

Domains (P value)	Age	Gender	DM Duration	Qualification	Marital Status	DM Type	DR Stage
General Health	0.01	0.52	0.02	<0.001	0.00	0.06	<0.001
General vision	0.08	0.41	0.33	<0.001	0.01	0.10	<0.001
Ocular pain	0.04	0.52	<0.001	<0.001	0.01	0.07	<0.001
Near vision	0.04	0.47	0.06	<0.001	<0.001	<0.001	<0.001
Distant vision	0.03	0.35	<0.001	<0.001	<0.001	<0.001	<0.001
Peripheral vision	0.05	0.55	<0.001	<0.001	<0.001	<0.001	<0.001
Social functioning	0.01	0.70	<0.001	<0.001	<0.001	0.05	<0.001
Color vision	0.03	0.54	<0.001	<0.001	<0.001	0.07	<0.001
Driving	0.05	0.19	<0.001	<0.001	<0.001	<0.001	<0.001
Role difficulties	0.03	0.56	0.85	<0.001	0.01	0.02	<0.001
Mental health	0.02	0.41	0.02	<0.001	<0.001	0.05	<0.001
Independency	0.04	0.55	0.14	<0.001	0.02	0.05	<0.001
Overall QoL	0.02	0.42	0.06	<0.001	0.02	0.01	<0.001

Discussion

As Oman's healthcare system improves, the average lifespan of its citizens also increases, leading to an increase in the incidence of DM.²³ Prolonged duration of DM increases the risk of developing DM and DR.²⁴ This study aimed to evaluate QoL among individuals with DR in a hospital-based population in Al-Buraimi, Oman, using the NEI-VFQ 25 questionnaire. This study examined variations in QoL based on differences in sex, age, DM duration, educational level, marital status, and DR severity. The study tool (NEI-VFQ-25 questionnaire) has demonstrated strong psychometric properties in previous studies for various ocular conditions, particularly DR, indicating that it can be reliably administered across multiple conditions with varying levels of diabetic risk in a sample.¹⁸

The mean overall QoL score for the current study was 41.53 ± 20.8 . The scores of the general health (38.07 ± 24.5), vision (38.42 ± 25.5) vision and role difficulties (37.21 ± 22.7) domains in the present study were observed to be the lowest compared with other domains. The findings of the present study were lower than those of the previous studies.^{18,19,23} The different results in this study compared to those of previous studies could be due to the differences in the sample size, study design (hospital-based), climatic, and cultural variation. In addition, awareness of health issues among patients with DM should be further increased to control DM complications.²⁵

The current study showed a significant correlation between the DR QoL score and age of participants ($p=0.02$), consistent with the results of different studies conducted in India and Spain.^{26,27} There was no significant difference between males and females in the QoL score between men and women, and the duration of DM had a less significant impact on the level of overall DR QoL ($p=0.06$) which was comparable with that reported by Pawar et al.¹⁹ Conversely, general health, ocular pain, near vision, distant vision, colour vision, and mental health were significantly correlated. The education of participants was significantly correlated with the overall score ($p = 0.02$), which was higher among postgraduate individuals compared with other levels, which could be due to higher condition-related awareness among the educated population. A significant difference was observed between the QoL scores of patients with type 1 and type 2 DM ($p=0.01$) which were higher in patients with type 2 DM, like previous findings.^{3,19,28} PDR type had a significantly lower score (32.1 ± 16.3) than those with NPDR (51.6 ± 21.5), and the correlation between the DR type and scores was strongly significant ($p=0.00$), which is consistent with most previous studies.^{19,26}

The present study showed that the QoL of patients with DR varied depending on age, type of DR, type of DM, qualification, and marital status. Authorities should focus on counselling and training to control and improve QoL predictions for all patients, especially those with DM. This study can provide the directions to design health policies for the treatment of DR, focusing on all the important aspects of QoL. This study provides insights into the problems associated with QoL in patients residing in Oman. We also recommend a detailed study to evaluate current condition-related managerial strategies and their impact on patients' QoL.

The limitation of the current study includes evaluation of the QoL score for the patients having complications such as diabetic macular edema or the proportion of patients receiving DR treatment, such as laser photocoagulation, anti-VEG injection, or PPV, which are important factors in quality-of-life scores. The vision related quality of life among DR patients could also differ based on the active or the stable phase of the condition, which should be explored separately. The QoL scores among diabetic patients could differ based on their treatment stage and patient satisfaction post treatment from the health center. A multicentric approach, having further details evaluating Hb A1c level, individual's macular status, and past DR treatments would also be useful.

Conclusion

QoL of the population with DR is negatively impacted by various factors, including demographics, disease severity, and types of DM Mellitus. It is crucial to evaluate these factors to enhance the QoL of patients with DR. Conducting regular QoL assessments can help physicians determine the most suitable management plan for each patient, leading to improved health outcomes and overall quality of health care services.

Abbreviations

DR, Diabetic Retinopathy; DM, Diabetes Mellitus; QoL, Quality of life; NPDR, Non-Proliferative Diabetic Retinopathy; PDR, Proliferative Diabetic Retinopathy; SD, Standard Deviation.

Data Sharing Statement

The datasets utilized and analysed in the present study are accessible from the corresponding author upon reasonable request, subject to the original HREC/S restrictions for use.

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Disclosure

The authors ensured that there were no conflicts of interest relating to the study, authorship, and publication of this article, as stated in the declaration provided by them.

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