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Original articles

An assessment of the vision-related quality of life among adult patients with diabetes mellitus in Accra, Ghana

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ABSTRACT

Purpose: To assess the overall vision-related quality of life (VRQoL) of adults with diabetes mellitus attending selected diabetic and eye care facilities in Accra, Ghana.
Methods: This was a hospital-based analytical cross-sectional study which took place from January to July 2023. A purposive consecutive sampling technique was used to select 150 participants. A questionnaire consisting of the WHO-PBD/VF20 and EuroQol Five Dimensional Scale instruments was used to obtain information pertaining to the demographic characteristics, vision-related quality of life and health-related quality of life of selected participants.
Results: The median participant age was 61.0 years. Participants with diabetic retinopathy had a worse mean overall total VRQoL score (19.4) than those without (79.9) in all domains; general visual functioning, 41.3 vs. 78.7, $p = 0.002$; general functioning, 15.1 vs. 80.2, $p = 0.001$; psychosocial, 35.7 vs. 79.3, $p = 0.001$; and visual symptoms, 24.4 vs. 80.4, $p = 0.001$. Participants with diabetic retinopathy also had a worse mean overall HRQoL score (17.4) than those without (81.0) in all domains; mobility, 32.4 vs. 79.6, $p = 0.001$; self-care, 53.9 vs. 77.6, $p = 0.001$; usual activities, 30.2 vs. 79.8, $p = 0.001$; pain/discomfort, 36.3 vs. 79.2, $p = 0.001$; and anxiety, 31.5 vs. 79.7, $p = 0.001$.
Conclusion: Our findings suggest a significant deterioration in both vision-related and health-related quality of life with the development of diabetic retinopathy. They highlight the need for nationwide screening programs to identify people with diabetes mellitus, as well as effective glycemic control to prevent the development of complications such as diabetic retinopathy.

Introduction

Diabetes mellitus (DM) has profound effects on the health status of affected patients. In 2019, the global prevalence of DM was found to be 463 million, representing a prevalence rate of 9.3%. Like many other non-communicable diseases, this is projected to rapidly rise to a staggering 700 million by 2045, translating to a prevalence of 10.9% [1]. This is largely attributed to the prevalence of obesity and unhealthy lifestyles [2]. A study in a Ghanaian population similarly found a prevalence of 6.46% for diabetes mellitus [3]. Diabetes mellitus has many deleterious effects on bodily organs, including the eye. "Eye diseases that can affect people with diabetes include diabetic retinopathy, macular edema (which usually develops along with diabetic retinopathy), cataracts, and glaucoma" [4]. These eye problems are collectively known as diabetic eye disease. The most frequent ocular complication of diabetes is retinopathy. It affects the eye by: damaging the small vessels of the retina, increasing the permeability of the vessels, causing retinal hemorrhages, formation of lipid exudates, and formation of weaker,

Abbreviations: DM, Diabetes mellitus; EQ-5D, EuroQol five-dimensional scale; EQ-VAS, EuroQol visual analog scale; HRQOL, Health-related quality of life; QOL, Quality of life; T2DM, Type 2 diabetes mellitus; VRQOL, Vision-related quality of life; WHO-PBD/VF20, World Health Organization prevention of blindness and deafness visual function 20.

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thin-walled capillaries [5]. The global prevalence of diabetic retinopathy has been estimated to be 95 million, representing a global prevalence of 35.4% [6]. In Ghana, a hospital-based cross-sectional study revealed a nationwide retinopathy prevalence of 15.5% [7]. These results were corroborated by an earlier study conducted in a West African population, which found the prevalence of diabetic retinopathy to be 17.9% [8].

Quality of life (QOL) is a concept which, at its core, aims to quantify the health of a person. Many studies have investigated the vision-related quality of life in many conditions, including diabetic retinopathy, using various instruments. These studies have been carried out in various settings all over the world. Various studies have shown significantly lower VRQOL scores in patients with diabetic retinopathy when compared to patients without retinopathy [9–11]. The impact of diabetic retinopathy on health-related quality of life has also been researched by many studies. These studies have found that DR significantly worsened the health-related QOL of affected patients when compared to diabetic patients with no retinopathy [12–14].

While there is a growing body of research exploring the effect of diabetes mellitus and retinopathy on vision-related QoL and health-related QoL worldwide, there remains the need to generate data that addresses this in Sub-Saharan African countries such as Ghana. This study thus aims to bridge this gap.

Materials and methods

This study was carried out in the National Diabetes Management and Research Center and Lions International Eye Centre of the Korle-Bu Teaching Hospital from January to July 2023, a 7-month period.

The study was designed to include all patients aged 20–70 years with diabetes mellitus attending the selected facilities, with the exception of the exclusion of patients with mental illnesses and other ocular morbidities which impair vision. The minimum sample size was calculated using Cochran's formula, and the prevalence was obtained from a study of diabetic patients in Ghana [3]. We used a purposive consecutive sampling method, recruiting 150 participants whose clinical diagnoses were confirmed from medical records. Data were collected using a validated standardized questionnaire consisting of three sections. The first section assessed the sociodemographic characteristics of participants, such as age, sex, educational status and marital status. The second section assessed the vision-related quality of life of the participants, using the WHO-PBD/VF20 questionnaire. It assessed the impact of visual impairment on quality of life in several domains, including general visual functioning, visual symptoms, general functioning and psychosocial symptoms. The third section ascertained the patients' health-related quality of life using the EuroQol Five-Dimensional Scale (EQ5D). It assessed the following domains: mobility, self-care, usual activites, pain and anxiety. The questionnaire was administered by the interviewer over a period of 20 min.

Data were entered into and analyzed with the Statistical Package for Social Sciences (SPSS) software version 25.0. Demographic and clinical characteristics of diabetic patients presenting at the study centres were analyzed by descriptive statistics and reported as median (interquartile range), means ± standard deviation, percentages and frequencies. The Chi-square test was used in comparing proportions, and where there were cells with less than five entries, Fisher's exact test was used. The vision-related quality of life of the patients with diabetes mellitus was analyzed. Patients were asked to rate their eyesight using both eyes with a five-point scale from "very good," "good," "moderate," "bad," to "very bad." Each subsequent question also used a 5-point response, with one indicating the highest and five the lowest score. The Kruskal-Wallis H test was used in testing the association between demographic characteristics and vision related quality of life score. The Mann-Whitney U Test was used in comparing differences in mean ranked score for vision-related quality of life (WHO/PBD-VF20 questionnaire) and the current health (EQ5D) in patients with diabetes mellitus with no visual involvement and patients with diabetes and diabetic retinopathy. P-values less than 0.05 were considered statistically significant.

Ethics approval was obtained from the Ethics Committee of the Korle-Bu Teaching Hospital (KBTH-ADM/000127/2023). Written informed consent was obtained from all participants.

Results

A total of one hundred and fifty participants were recruited into the study, consisting of 99 females (66.0%) and 51 males (34.0%) (Table 1). The majority of the participants were aged 41−70 years (142, 95.0%) (Table 1). The median (interquartile) age was 61.0 (11.0) years. The youngest recorded age of the participants was 22 years, and the oldest was 70 years. Forty-six point seven percent (46.7%) of the participants had attained secondary education (Table 1). The most common type of diabetes among the study participants was type 2 (Table 1).

The mean vision-related QOL score for patients with diabetes mellitus without diabetic retinopathy was 79.9 (Table 2). The total mean score for those with diabetic retinopathy was 19.4 (Table 2). In all the domains, patients with DR had significantly worse mean scores than those without retinopathy. The presence of renal disease and diabetic eye disease were associated with significantly poorer VRQOL scores.

The mean health related QOL score for patients with diabetes mellitus without retinopathy was 81.0 (Table 3). The total score in patients with DR was 17.4 (Table 3). Patients with DR experienced significantly poorer scores in all domains when compared to those without retinopathy.

Discussion

Of the 150 participants, the majority, 99 (66%), were female, and 51 (34%) were male. This varied from a study conducted in Kenya, with a

Table 1
Sociodemographic characteristics and overall QoL score of participants.

Characteristics	Overall QoL score		P-value
	Number	Mean Rank	
Age:			0.451
<40	8	64.3	
41−70	142	76.13	
Sex:			0.332
Male	51	70.777.9	
Female	99		
Marital status:			0.309
Single	14	93.373.466.580.4	
Married	97		
Divorced	17		
Widowed	22		
Education:			0.077
None	8	76.387.865.982.6	
Basic	2970		
Secondary	43		
Tertiary			
Duration of diagnosis:			0.107
<5 years	33	86.3	
> = 5 years	117	72.5	
Type of diabetes			0.710
Type 1	35	70.277.177.6	
Type 2	111		
Gestational	4		
Hypertension:			0.693
Yes	107	74.677.7	
No	43		
Renal disease:			0.019*
Yes	13	48.277.6	
No	136		
Diabetic eye disease:			0.000*
Yes	36	52.382.8	
No	114		

The Kruskal–Wallis H test*.

Table 2
VRQoL scores in participants with diabetic retinopathy.

Domain	Diabetic retinopathy		P-value
	Yes	No	
General visual functioning:			0.002*
Number	13	137	
Mean rank	41.3	78.7	
Visual symptoms:			0.001*
Number	13	137	
Mean rank	24.4	80.4	
General functioning[β]:			0.001*
Number	12	137	
Mean rank	15.1	80.2	
Psychosocial symptoms:			0.001*
Number	13	137	
Mean rank	35.7	79.3	
WHO/PBD-VF20 score[β]:			0.001*
Number	12	137	
Mean rank	19.4	79.9	

The Kruskal-Wallis H test*.
[β] One missing data for domain.

Table 3
HRQoL scores in participants with diabetic retinopathy.

Domain	Diabetic retinopathy		P-value
	Yes	No	
Mobility:			0.001*
Number	13	137	
Mean rank	32.4	79.6	
Self-care:			0.001*
Number	13	137	
Mean rank	53.9	77.6	
Usual activities:			0.001*
Number	13	137	
Mean rank	30.2	79.8	
Pain/discomfort:			0.001*
Number	13	137	
Mean rank	36.3	79.2	
Anxiety:			0.001*
Number	13	137	
Mean rank	17.4	81.0	
Overall EQ5D score:			0.001*
Number	13	137	
Mean rank	31.5	79.7	

The Kruskal–Wallis H test*.

female predominance of 56% of the population [9]. This can be attributed to differences in the study setting and design. Type 2 DM was the most frequent form of diabetes seen, with 111 of the 150 participants reporting being diagnosed with such. This is consistent with studies which have found T2DM to be the most common type of diabetes mellitus worldwide [15]. A total of 13 of the study participants (8.6%) had diabetic retinopathy, while 137 participants had diabetes mellitus without retinopathy. This is less than in a study of visual impairment among adult diabetics in a Ghanaian population, which revealed that 15.5% of the individuals in the study had diabetic retinopathy [7]. This finding is corroborated by a multicenter study carried out in Ghana and Nigeria, which found a similar prevalence rate (17.9%) of diabetic retinopathy among cases [8]. The disparity in values may be related to the study participants and sampling strategy employed.

Persons with diabetes mellitus were revealed to have a reduced but good vision-related quality of life, evident in all domains of the WHO PDF VF-20 questionnaire, with an overall mean score of 79.9. General visual functioning was the most affected, with participants reporting a mean quality of life score of 78.7, followed by psychosocial functioning (79.3) and general functioning (82.5). The visual symptoms dimension was least affected, with participants reporting a mean score of 80.4. Using the VFQ-25 tool in the EUROCONDOR trial, Trento et al. (2017) also found that their participants' visual symptoms were least affected by their condition, with participants reporting a mean score of 83.8 [16]. Female participants, when compared to males, were found to have better mean scores for general visual functioning (77.2), general functioning (77.7) and psychosocial symptoms (79.6), indicating a comparatively better quality of life. This may be because of better health-seeking behavior by women when compared to men [17].

Thirteen participants had diabetic retinopathy, and their overall mean VRQoL score was 19.4. This is lower than the mean score (i.e., 33.4 +/− 11.5) found by Emade et al. (2023) in their study [9]. A possible explanation for this difference may be the smaller number of participants with diabetic retinopathy enrolled in this study.

With a mean score of 15.1 in this study, general functioning was the most negatively impacted dimension.

This study establishes that participants with diabetic retinopathy have significantly poorer VRQoL scores, overall and in all domains, when compared to those with diabetes without retinopathy. This result is consistent with findings of other studies around the world [18,19].

On assessment of the health-related quality of life using the EQ5D5 L instrument, participants with diabetes mellitus generally reported their health to be good. The mean HRQoL score reported for persons with diabetes mellitus with no visual involvement was 81.0. This value is similar to the mean score of 80.0 obtained in a Vietnamese population [20]. This may be due to similarities in the quality of health care delivery in the two countries. The mean score in this Ghanaian population is, however, lower than findings reported in an Iranian population [21]. The variation in the scores found in these studies may be attributed to a relatively poorer Ghanaian health system.

In this study, it was discovered that women had better median HRQoL scores than men (77.9 vs. 70.8). Our findings are comparable to those reported in studies carried out in Indian and Omani populations [22,23]. This also may be because women have been demonstrated to practice better health-seeking behavior when compared to men [17]. One study conducted in an Iranian population, however, found contrasting results [24]. Participants reported the lowest mean score of 77.6 in the self-care dimension. Some of these participants experienced slight to no difficulty in washing and dressing themselves, while others experienced moderate difficulties in this regard.

Participants with diabetic retinopathy generally reported poorer health as assessed by the EQ-5D-5 L instrument. The overall mean HRQoL score for these individuals was 17.4. Participants with retinopathy achieved significantly lower mean scores for all the domains of the instrument. Similar findings were documented in a previous study in Suzhou, China [25]. With a poor mean HRQoL score of 30.2, individuals with retinopathy encountered the most severe problems while carrying out their usual daily activities when compared to other domains.

Persons with diabetic retinopathy achieved significantly poorer mean scores in all domains except pain/discomfort when compared to diabetic patients without retinopathy. This is corroborated by the findings of Sharma et al. (2005), whose results indicated that diabetic retinopathy resulted in quantitative and qualitative decreases in the HRQoL of affected individuals [26].

Our study has some limitations. It did not objectively assess the visual acuity of participants and did not grade the severity of diabetic retinopathy in the affected participants. Thus, relationships could not be investigated between the VRQoL and severity of diabetic retinopathy. Our study did not utilize the EuroQol Visual Analog Scale (EQ-VAS). The use of this scale as an adjunct to the EQ5D5 L would have provided a better global assessment of the patient's health by incorporating the patient's personal judgement. The study is a cross-sectional study with a limited sample size, and thus, the findings cannot be generalized to the entirety of the Ghanaian population. Documentation could not be obtained for the HbA1c values in most of the study population; thus, glycemic control and its attendant effects on the progression of diabetes mellitus complications could not be assessed.

Conclusion

Diabetic retinopathy is shown to significantly decrease the vision-related and health-related quality of life of affected adult patients. This study is relevant, as it addresses a paucity of published data on this topic in a Ghanaian setting. Incorporation of QOL assessment in patient care will give a holistic appreciation of the health status of patients. As healthcare practitioners, we must find effective and practical ways to detect diabetes mellitus early and prevent the development of retinopathy in order to ensure optimal QOL outcomes for our patients. This study advocates for the implementation of nationwide screening programs to detect diabetes mellitus. This will improve early detection of cases and enable the institution of effective glycemic control to prevent disease progression. Fundoscopy services should be made available at diabetic centers to detect early stages of diabetic retinopathy in unsuspecting patients.

Authors' contributions

Study concept and design: YAE, KAA.
Acquisition of data: YAE.
Analysis and interpretation of data: BA, YAE.
Drafting of the manuscript: YAE, KAA, VAE.
Manuscript revision and critical comments: KAA, VAE.
All authors approved the manuscript.

Study approval

This study was conducted at the National Diabetes Management and Research Center and the Lions International Eye Centre of the Korle-Bu Teaching Hospital from January 2023 to July 2023, following the tenets of the Declaration of Helsinki and with the approval of the Ethics Committee of the Korle-Bu Teaching Hospital (KBTH-ADM/000127/2023).

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

The authors declare that they obtained written informed consent from the patients and/or volunteers included in the article and that this report does not contain any personal information that could lead to their identification.

Data availability statement

Data are available on reasonable request.

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