

Awareness of Diabetic Retinopathy in Diabetic Individuals Based on Knowledge, Attitude, and Practice in Cameroon: A Multicentre Study

Godefroy Koki^{1,2}, Fanny Nyoh Mbacham^{1*}, Jose-Palatine Sohnagou¹,
Chancelline Ntoh Nnangsope Alunge¹, Annita Raïssa Fleur Ekoumelon Épse Dikongue²,
Prisca Nyamsi Biangoup², Rodrigue Essoumam Ngwesse¹, Sorel Ingrid Eloundou Bana¹,
Sonia Josephine Wokden¹, Bruno Zabi Fadanka¹, Françoise Laure Noubeth Ndgishe¹,
Assumpta Lucienne Bella¹

¹Faculty of Medicine and Biomedical Sciences, University of Yaoundé I, Yaoundé, Cameroon

²Second Region Military Hospital, Douala, Cameroon

Email: *mfannyoh@gmail.com

How to cite this paper: Koki, G., Mbacham, F.N., Sohnagou, J.-P., Alunge, C.N.N., Ekoumelon Épse Dikongue, A.R.F., Nyamsi Biangoup, P., Ngwesse, R.E., Eloundou Bana, S.I., Wokden, S.J., Fadanka, B.Z., Noubeth Ndgishe, F.L. and Bella, A.L. (2024) Awareness of Diabetic Retinopathy in Diabetic Individuals Based on Knowledge, Attitude, and Practice in Cameroon: A Multicentre Study. *Open Journal of Ophthalmology*, **14**, 418-427.

<https://doi.org/10.4236/ojoph.2024.144039>

Received: October 6, 2024

Accepted: November 24, 2024

Published: November 27, 2024

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Abstract

Introduction: Diabetic retinopathy accounts for 5% of all causes of blindness. We set out to assess knowledge, attitude, and practice patterns in patients with diabetes regarding diabetic retinopathy (DR) and identify barriers that may exist in this context. **Material and Methods:** We conducted a cross-sectional study by consecutively enrolling patients with diabetes consulting at four hospitals in Cameroon between November 2021 and March 2023. We surveyed participants about their understanding of diabetic retinopathy (DR), their approach to it, and their visits to eye specialists by means of a single-investigator-interviewer-administered questionnaire. Data was anonymously analysed using STATA/BE 17 and presented in frequencies and Spearman's correlation coefficient. The error margin was 5% and all results with p-value <0.05 were considered statistically significant. **Results:** We enrolled 152 patients with type 2 diabetes mellitus, with a mean age of 60.30 years and a male-to-female ratio of 0.9. Out of the 152 patients enrolled, 138 (90.59%) agreed that the eyes could be damaged by diabetes. Meanwhile, only 21 (15.79%) associated diabetes with DR. Of the 41.18% who were occasionally sent for an eye exam by their consulting physicians, 91.72% made it to the consultations. Spearman's correlation showed no significant relationship between the knowledge of eye involvement in diabetes and visits to eye specialists, regardless of blood sugar levels (p = 0.30). **Conclusion:** We were able to show that there is a lack of sensitization of patients with diabetes on diabetic retinopathy and referral to ophthalmologists.

Keywords

Diabetic Retinopathy, Awareness, KAP, Cameroon

1. Introduction

In recent years, improvements in diabetes treatment have reduced macrovascular mortality, allowing diabetic patients to live longer. However, this extended lifespan increases the risk of developing diabetic retinopathy (DR), a microvascular complication that can lead to vision impairment and is a leading cause of blindness among working-age populations [1]. According to a systematic review and meta-analysis conducted in 2021, the global prevalence of DR was 22.27%. It is expected to rise from 103.12 million in 2020 to 160.50 million by 2045, with vision-threatening diabetic retinopathy (VTDR) projected to increase from 18.83 million to 44.82 million without prompt intervention [1]. Diabetic retinopathy prevalence is highest in Africa (35.90%) [2]. Hospital-based studies in 3 different urban regions in Cameroon (Bamenda, Douala and Yaoundé) showed a prevalence of diabetic retinopathy of 20.6%, 40.3% and 49.9% respectively [3]-[5]. Preventing vision loss is crucial, as it significantly impacts a patient's quality of life, underscoring the need for early detection. The Center for Disease Control and Prevention (CDC) states that about 90% of diabetes-related vision loss can be prevented through regular eye exams [2]. This highlights the importance of annual eye examinations for all diabetic patients, even before any signs of vision problems appear. In low-income countries, there is limited access to eye care services and trained eye care professionals. Therefore, continuously assessing awareness, identifying misconceptions and barriers to prompt diagnosis, regular follow-up, and early treatment provides opportunities for innovative and comprehensive approaches to reduce the burden of DR. This study aimed to identify knowledge gaps, attitudes, and behavioral patterns regarding diabetic retinopathy among patients with diabetes attending four tertiary hospitals in Cameroon.

2. Methods

2.1. Study Population

We conducted a cross-sectional hospital-based study, enrolling participants from four tertiary hospitals in Cameroon between November 2021 and March 2023: the 2nd Region Military Hospital in Douala, the Yaoundé Gynaeco-Obstetric and Paediatric Hospital, the Yaoundé Central Hospital, and the University Teaching Hospital of Yaoundé. Our study included patients with type 2 diabetes who were willing to participate, aged 18 years or older, mentally capable of answering questions, and provided informed consent.

2.2. Data Collection

The procedure was standardized and implemented successively across all

participating hospitals. We utilized a consecutive sampling approach to recruit patients with type 2 diabetes who were receiving care at both the ophthalmology and endocrinology departments. Following initial participant identification and registration, eligible patients were scheduled for comprehensive interviews at their respective healthcare facilities. These interviews were conducted using a structured questionnaire designed to assess their knowledge, attitudes, and practices regarding diabetic retinopathy.

The questionnaire employed a five-point Likert scale and was available in both English and French and was verbally administered by a single trained investigator to ensure consistency. The investigator's training comprised understanding questionnaire content, proper administration techniques, role-playing exercises, and supervised practice interviews with pilot participants. Performance was evaluated using a standardized checklist to ensure consistent data collection. Initial development involved a comprehensive literature review of existing knowledge, attitude, and practice (KAP) studies on diabetic retinopathy, followed by expert panel review. For linguistic validation, the questionnaire underwent forward translation from English to French by two independent bilingual healthcare professionals, followed by reconciliation of the translations. For participants who had difficulty understanding or communicating in English or French, language accommodations were made in two ways: the interviewer either communicated in broken English, or received translation assistance from caregivers or hospital staff who were fluent in the participant's native language.

2.3. Data Analysis

All data was entered into Microsoft Excel for Microsoft 365 and analysed on STATA/BE 17. Our results are presented in mean, frequencies, and spearman rho. All p-values <0.05 were considered statistically significant on a 95% confidence interval.

3. Results

We enrolled a total of 152 participants in our study, with a gender ratio of 0.9. The mean age of our study population was 60.30 ± 11.93 years. Most participants (61.18%) had diabetes for 5 to 15 years, while 38.82% had it for less than 5 years.

Knowledge: regarding knowledge assessment, 90.59% (n = 138) of participants acknowledged that diabetes could harm the eyes (**Figure 1**), and 86.19% (n = 131) recognized a connection between diabetes and reduced vision (**Figure 2**).

Attitude: only 16.47% of participants regularly visited their eye specialists of their own accord (**Figure 4**).

Of the study participants, 45.40% had never been referred for an eye examination. Among the 51.31% (**Table 1**) who were occasionally referred for an eye examination by their consulting physicians, 91.72% attended the consultation.

However, 84.21% (n=128) had no opinion or knowledge about diabetic retinopathy and its risk factors (Figure 3). Notably, 28.24% of participants

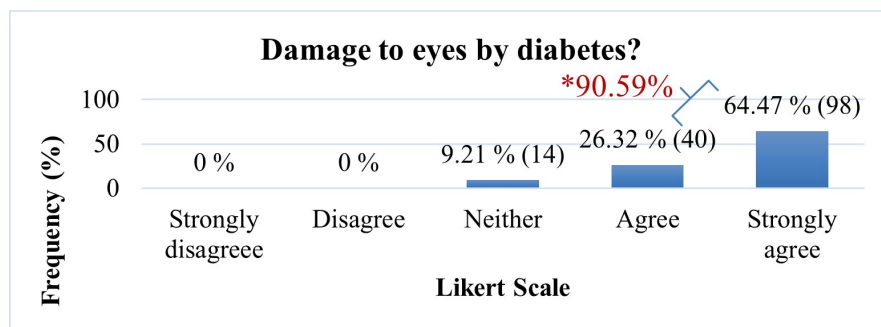


Figure 1. Distribution on awareness of eye damage by diabetes.

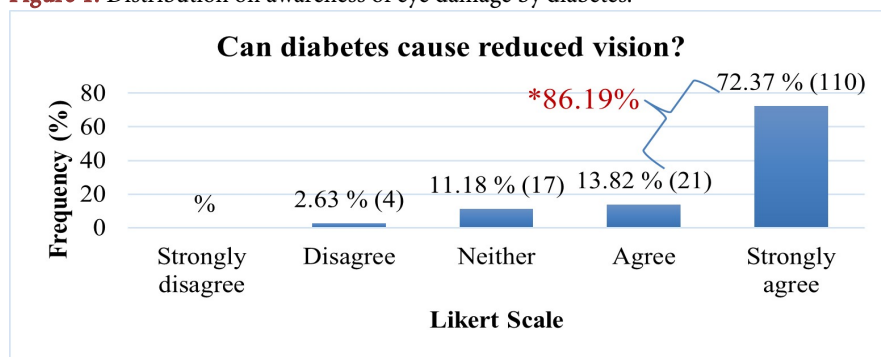


Figure 2. Distribution on awareness of reduced vision.

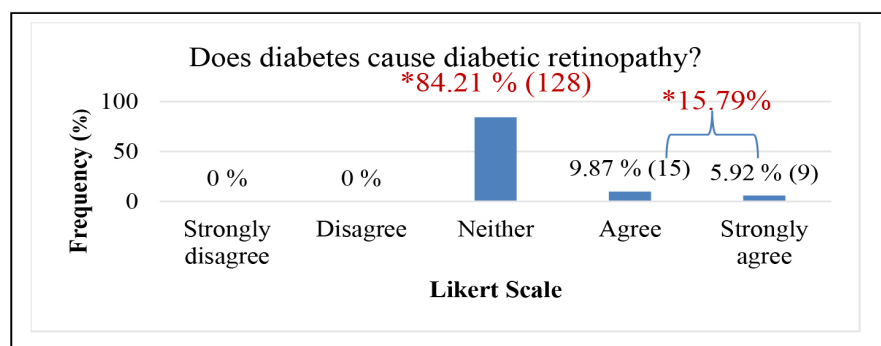


Figure 3. Distribution on awareness of diabetes being a causal factor.

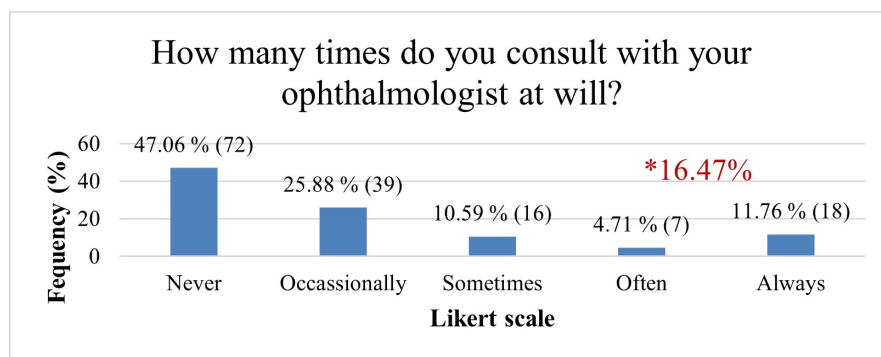


Figure 4. Distribution of attitude for annual eye exam.

reported never being informed by their physicians about the impact of diabetes on the eyes, and 21.18% were rarely informed, resulting in 49.42% of participants who were either never counseled or very rarely informed by their physicians.

Table 1. Crosstabulation showing relationship between physician visits and referral to an ophthalmologist.

	How many times where you referred to an ophthalmologist?				
	Never	Occasionally	Sometimes	Often	Always
Never (0/year)	0	0	0	0	0
Occasionally (1/year)	2	0	0	0	0
Sometimes (2/year)	1	0	0	0	0
Often (3 - 4/year)	6	3	0	0	0
Always (>5/year)	13	6	0	0	5
TOTAL	69 (38.82%)	78 (51.31%)	0 (0%)	0 (0%)	5 (3.29%)

Practice: there was no significant correlation ($\rho = 0.11$, $p = 0.30$) between participants' knowledge of ocular involvement in diabetes and their practice of visiting an ophthalmologist, regardless of their blood sugar levels.

4. Discussion

4.1. Knowledge

Data and information obtained regarding the Knowledge, Attitude, and Practice (KAP) patterns within the population are invaluable for identifying potential misconceptions and beliefs that act as obstacles to behavioral change. The questions in the knowledge section were specifically designed to evaluate awareness, particularly concerning the understanding of diabetic retinopathy. In our study, we demonstrated that 90.59% of our participants acknowledged that diabetes could harm the eyes. This finding is consistent with a study by Prabhu *et al.* in 2015 in South India, where 72.5% of their subjects recognized the connection between diabetes and eye damage [6]. It's important to note that both studies focused on diabetic individuals, who are expected to be more aware of diabetes-related complications than the general population. A total of 86.19% of our participants agreed that diabetes could lead to reduced vision. However, 84.21% of them lacked knowledge about diabetic retinopathy, its causes, and risk factors. We suggest that this disparity might be attributed primarily to the high doctor-to-patient ratio and limited consultation time that characterizes healthcare delivery in our context. These constraints likely compromise the quality and effectiveness of patient education and sensitization, resulting in a phenomenon of surface-level awareness that has been well-documented by other researchers. A study done by Snirivasan *et al.* in 2017 in India revealed that among patients with good knowledge of diabetes, only 4.5% were aware of what diabetic retinopathy was [7]. Satisfactory knowledge on DR only made up 8.5% of the study population in a study done by Said *et al.* in Egypt [8]. Evidence from published research has highlighted how such

knowledge gaps can impede timely diagnosis and appropriate treatment, thereby increasing the risk of severe visual impairment [8] [9]. This is even more crucial given that the individual risk of developing microvascular complications has decreased in recent years due to improvements in diabetes management, leading to increased life expectancy among diabetic patients [10]. However, this extended lifespan paradoxically increases the likelihood of developing complications such as diabetic retinopathy, which is strongly correlated with disease duration [11].

To address these knowledge gaps, we propose developing culturally appropriate educational materials in both French and English to ensure broader accessibility. This can be complemented by creating short, informative videos to be played in waiting areas, maximizing patient exposure to essential information during their hospital visits. Additionally, we suggest integrating into the diabetes group education sessions, peer educator programs that leverage the experience of successfully managed diabetic patients, as they can provide relatable guidance and practical insights.

4.2. Attitude

Furthermore, 28.24% of our participants reported never receiving information from their healthcare providers about the impact of diabetes on the eyes, while 21.18% stated that they were rarely informed. This amounts to a total of 49.42% who were either never counselled by their physicians or received minimal information. Consequently, only 16.47% of the participants regularly visited an ophthalmologist as compared to 80% and 93.3% according to Namperumalsamy *et al.* and Rani PK *et al.* in India [12] [13]. Snirivasan *et al.* in 2017, found that awareness of diabetic retinopathy and good knowledge of diabetes were significantly associated with good practice patterns regarding diabetic retinopathy [7]. This evidence highlights the need to place greater emphasis on the importance of annual eye examinations, referrals to ophthalmologists at initial diabetes diagnosis, and regular follow-up counselling by eye care specialists. Without adequate information, patients may delay seeking ophthalmological care until vision-threatening complications have developed or become irreversible.

Koki *et al.*'s study in Douala hospitals found general practitioners lacked proper training in fundoscopic examinations [14]. To improve diabetic eye care services, we propose four main solutions: establishing integrated 'one-stop' diabetic clinics staffed with trained general practitioners would streamline patient care by integrating eye screening services, thereby reducing multiple hospital visits and increasing screening uptake, implementing mobile eye screening services for remote areas, creating fast-track appointment systems, and developing telemedicine programs where possible. These interventions aim to enhance access, efficiency, and quality of diabetic eye care services.

To enhance care coordination and provider engagement in diabetic eye care, we suggest implementing mandatory diabetes care checklists in medical records, establishing standardized referral pathways between healthcare providers, monitoring provider performance through quarterly reports, and promoting continuous

education about diabetic retinopathy using online resources.

4.3. Practice

There was no significant correlation between control of blood sugar levels and the practice of regular visits to the ophthalmologist. This aligns with the findings of Prabhu *et al.*, who identified a poor practice pattern (51.1%) where patients believed that controlling their blood sugar would avoid visits to the ophthalmologist [6]. However, Rani *et al.* and Namperumalsamy *et al.* showed better results with 36.5% and 3.5% of their study populations visiting an ophthalmologist regardless of their blood sugar level [12] [13]. The discrepancy between studies may be explained by the fact that our survey was hospital-based and on patients with diabetes. Meanwhile, that done by Rani *et al.* and Namperumalsamy *et al.* were population-based studies. Annual eye exams or more frequent visits despite the blood sugar level must be emphasized in patient follow-up because neural retinal damage and clinically invisible microvascular changes progress before first clinical signs of vision impairment [15].

4.4. Strengths

A key strength of our study lies in its ability to highlight significant discrepancies between knowledge, attitudes, and practice patterns regarding diabetic retinopathy. These identified gaps provide a crucial foundation for future research aimed at establishing cause-effect relationships between these parameters. Understanding these relationships will be instrumental in developing targeted interventions to reduce the burden of diabetic retinopathy in our population.

Our use of face-to-face interviews, rather than self-administered questionnaires, allowed for clearer explanation of questions and more accurate data collection, particularly beneficial for participants with varying literacy levels.

4.5. Limits

A significant study limitation was the reliance on a single principal investigator to conduct all interviews across four tertiary hospitals. This resulted in extended waiting times between patient recruitment and interviews. These delays potentially introduced selection bias, as patients who remained in the study may have differed in key characteristics from those who dropped out due to the wait times. This limitation suggests that future studies should consider employing multiple trained interviewers to facilitate more efficient data collection and minimize participant attrition.

The study's cross-sectional design, while useful for initial assessment, limited our ability to capture the dynamic nature of knowledge, attitudes, and practices regarding diabetic retinopathy. By providing only a snapshot at a single point in time, this design prevented us from evaluating how these parameters evolve over time or assessing the temporal relationships between knowledge acquisition and subsequent changes in attitudes and practices. A longitudinal study design would be better suited to understand these temporal patterns and cause-effect relationships.

Being hospital-based and conducted exclusively in urban tertiary centers in Douala and Yaoundé, our findings may not reflect the broader diabetic population, particularly those without access to specialized healthcare facilities. This urban focus potentially limits generalizability to rural populations, where healthcare access and socioeconomic conditions differ significantly. Furthermore, patient recruitment during standard clinic hours may have systematically excluded working individuals, introducing potential sampling bias. These limitations suggest that our findings should be interpreted within the context of an urban, tertiary care-seeking population.

5. Conclusion

In conclusion, this study aimed to assess knowledge, attitudes, and practices (KAP) related to diabetic retinopathy among patients with type 2 diabetes in our population. Our findings revealed significant knowledge gaps and poor attitudes and practices regarding diabetic retinopathy among these patients. These findings emphasize the need to reinforce the pivotal role of physicians at all points of patient contact. This includes implementing both hospital-based and community-based patient education strategies to: emphasize the insidious nature of diabetic retinopathy, highlight its potential to cause blindness, stress the importance of regular follow-up, and ensure mandatory referral of diabetic patients to ophthalmologists for baseline examination and annual check-ups.

Acknowledgements

The authors express their gratitude to all the staff at various medical units, including the ophthalmology and endocrinology departments, and to the study participants. Special thanks are extended to Professor Assumpta Bella Lucienne for her supervision of this work and to Mrs Mvom, head of the association of patients with diabetes in Cameroon (ACADIA), who encouraged members to participate in this study.

Ethical Considerations

The Second Region Military Hospital Ethics Committee (SRMHEC) acted as the central review board and was accepted by all participating institutions under the approval number 01240313SRMHEC. Research authorisations were obtained from all hospitals.

Consent to Participate

A signed informed consent was obtained from each participant before starting interviews.

Data Availability

All data that supports the findings of this study are available from the authors but restricted from public availability due to non-acquisition of consent from

participants.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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