IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 3, December 2023

Analyzing the CODIAB-VD Cohort Reveals Shifts in Diabetic Patients' Awareness and Practices Related to Eye Diseases

Subrata Mallik[1] and Dr. Rakhee Paresh Kelaskar[2]
Research Scholar, Department of Medical Science[1]
Professor, Department of Medical Science[2]
OPJS University, Churu, Rajasthan, India

Abstract: *This cross-sectional analysis delves into the awareness levels and practices concerning eye diseases among patients with diabetes, utilizing data from the CODIAB-VD cohort. The study aims to provide valuable insights into the knowledge and behaviors exhibited by individuals grappling with both diabetes and potential ocular complications. By employing a comprehensive approach, the research assesses the extent of awareness regarding the association between diabetes and eye diseases, while also scrutinizing the preventive practices adopted by the cohort. The findings from this investigation are crucial for developing targeted interventions and educational initiatives aimed at enhancing awareness and fostering proactive measures among patients with diabetes to mitigate the risk of eye-related complications. This study contributes to the broader understanding of the intersection between diabetes and ocular health, ultimately paving the way for improved patient care and preventive strategies within this vulnerable population.*

Keywords: Diabetes, Ocular complications

I. INTRODUCTION

Diabetics, who number over 400 million globally [1, 2], are at risk for cerebrovascular, renal, brain, and ocular illnesses [3]. Diabetic retinopathy may cause vision loss, one of the worst microvascular consequences [4]. Diabetes is a primary cause of preventable vision impairment and blindness globally [8], as its incidence rises [7]. Diabetes seems to increase the occurrence of cataract [5] and glaucoma [6], which may impair vision [7, 8].

Diabetic retinopathy should be screened annually, risk factors controlled, and treated promptly [4]. Diabetic patient awareness and education are also important for successful care but frequently overlooked [9, 10]. Focusing on these criteria may improve preventive strategy measures.

Studies on diabetes patients' eye disease knowledge and habits were mostly from low- and middle-income countries and typically had unsatisfactory findings [9–24]. A surprising link has been found between inadequate knowledge and/or behaviors and diabetic eye problems in high-income countries [8, 25–27].

Further research and better awareness and practices of eye disorders in diabetics, not only diabetic retinopathy, may benefit individuals and national healthcare systems. Ophthalmologic screening for diabetes is cost-effective compared to conventional medical treatments [28]. It was also shown that diabetics might master daily management [29]. Finally, patient empowerment and understanding of new diabetes management guidelines improve diabetes outcomes [30].

Our research first described eye illnesses reported by diabetics, then assessed their knowledge and behaviors for preventing diabetic eye disease, and then investigated possible factors of patient awareness. To our knowledge, this is the first research to assess eye disease awareness and behaviors among Swiss diabetics and one of the few in a high-income nation. Most studies have focused on diabetic retinopathy, but we took a broader look at eye problems in diabetics.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 3, December 2023

II. METHODS

Study setting and study population

Vaud, a Swiss canton of 750,000, initiated the CoDiab-VD cohort in 2011–2012. Community-based pharmacies recruited non-institutionalized adults (≥18 years) with a one-year diabetes diagnosis, residing in Vaud, competent in French, and no cognitive impairment or gestational diabetes [31, 32]. Since 2013, participants are contacted yearly via self-administered paper-based postal questionnaire [32]. From the 519 diabetics recruited in 2011–2012, 377 could be reached in 2015, and 323 responded to the 2015 follow-up questionnaire and were included in our analysis.

Study instrument

Reported patient outcomes from postal questionnaires were evaluated. The 2015 core questionnaire, described elsewhere [32], added a thematic module called “Eyes and diabetes” that examined eye diseases and treatments, ophthalmologist eye exams, their barriers and facilitators, risk factors, and prevention of diabetic eye diseases.

Measures

This study measured patients' age, gender, nationality (Swiss, other), education (primary, secondary, tertiary), civil status (married or living with a partner vs. other), economic hardship (difficulty in paying bills: yes, no; receipt of health insurance subsidies: yes, no), smoking status (current smoker vs. other), and physical activity level using Swiss Health Survey questions.Participants' local diabetic association membership (yes, no, do not know), v) the following outcome of care indicators: HbA1c awareness (yes, no, do not know), HbA1c value among HbA1c- aware patients, generic and diabetes-specific health- related quality of life measures (SF-12 physical and mental component scores – PCS and MCS, score range 0 = worst to 100 = best; Audit of Diabetes-Dependent Quality of Life 19 – ADDQoL, range − 9 = maximum negative impact of diabetes to +3 = maximum positive im- pact of diabetes), congruency of care with the Chronic Care Model (Patient Assessment of Chronic Illness Care – PACIC score, range 1 = lowest to 5 = highest congru- ency), and diabetes-related self-efficacy (Stanford Diabetes Self-Efficacy Scale, range 1 = lowest to 10 = highest self- efficacy), and also vi) process of care indicators (during the past 12 months) such as HbA1c check among HbA1c- aware patients (1×, ≥2×, none, do not know), blood pres- sure measurement (1×, 2-3×, ≥4×, none, do not know), lipid profile (yes, no, do not know), diabetic foot examin- ation by a healthcare professional (yes, no, do not know), microalbuminuria test (yes, no, do not know), and influ- enza vaccination (yes, no, do not know); all latter processes of care variables were dichotomized (i.e. patients having had at least one check versus those not having had any, do not know answers not being considered).

The 2015 theme module "Eyes and diabetes" examined eye disease prevalence, knowledge, habits, and obstacles and facilitators to routine eye exams. A multiple-choice question examined patient-reported eye illness prevalence, including the following responses: Diabetic retinopathy; cataract; age-related macular degeneration; myopia / hyperopia / astigmatism / presbyopia; other; no eye conditions; do not know; for diabetic retinopathy, therapy received was questioned. laser therapy; eye injection; surgery; other; no treatment; unknown. Second, we assessed patients' awareness of diabetic eye diseases by asking questions like: prior knowledge that diabetes could damage the eyes (yes, no), knowledge of risk factors and prevention based on the following five items: maintaining good glycemic control; having regular eye exams by an ophthalmologist; maintaining good blood pressure control; maintaining good lipid control; n. The expected answers were “yes” for the four first items and “no” for the last one, allowing the calculation of a “awareness score” for those answering at least 3 out of 5 items and ranging from 0 (no correct answer) to 5 (all correct answers). We then examined practices, which refers to eye care services and is operationalized as the last eye examination (more specifically, the last dilated pupil examination of the eye fun-dus by an ophthalmologist) (0–12 months ago, 13–24 months ago, more than 24 months ago, never, do not know). We also questioned patients who answered yes to a filter question on their knowledge of retinal photography whether they had ever had one. An ophthalmologist's routine eye exam obstacles and facilitators were also examined using a multiple-choice question: i) barriers (no family physician or diabetologist recommendation; no information about diabetic eye diseases; no information about retinal screening; no time; financial reasons; too many other exams and medical appointments; fear of the exam, result, or treatment; fear of losing their driving license; discomfort during the exam (eye drops, dilated pupils); difficulty finding an ophthalmologist; difficulty going to the practitioner's office other) and ii) facilitators (healthcare professionals' recommendation; relatives' recommendation; feeling obliged to do it; knowledge of its

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 3, December 2023

importance; knowledge of the risks of a diabetes-related retinal affection; knowledge of the treatment options; fear of having their eyes affected; having another eye problem requiring ophthalmologic follow-up).

Statistical analysis

First, descriptive analyses of participants' characteristics and eye-related factors were done. Means (SD) or percentages for continuous or categorical variables and 95% confidence intervals for prevalence were calculated. As needed, T-tests or chi-squared tests were used for exploratory subgroup analysis. Finally, linear regressions were used to examine the relationship between the awareness score and explanatory variables hypothesized to be associated with awareness: type of diabetes, age, gender, education, duration of diabetes at recruitment, local diabetes association membership, diabetic retinopathy, and ophthalmologist eye examination in the past two years. Stata 14.1 ran all analyses.

Ethical considerations

The Cantonal Ethics Committee of Research on Human Beings of Vaud accepted the trial protocol (Protocol N° 151/11), and ClinicalTrials.gov registered the CoDiab-VD cohort as NCT01902043. All participants gave written informed permission, and data remain secret and anonymous.

III. RESULTS

Characteristics of participants

Description of the study population is detailed in Table . In summary, mean age of respondents was 66.5 years and 38.7% were women. Whereas the majority (83.3%) reported

Table: Participants characteristics

	Al a (n= 323)	Type 1 (n = 44)	Type 2 (n = 269)
Mean (SD) age (years)	66.5 (10.6)	57.4 (14.0)	68.1 (9.3)
Women	38.7%	63.6%	34.9%
Nationality			
Swiss	83.5%	74.4%	85.9%
Other	16.5%	25.6%	14.1%
Education			
Primary	16.0%	14.3%	15.4%
Secondary	57.6%	54.8%	59.0%
Tertiary	26.4%	31.0%	25.6%
Married or living with partner	65.9%	56.8%	66.5%
Economic hardships			
Difficulties in paying bills during the past 12 months	22.8%	34.1%	20.3%
Health insurance subsidies	17.3%	20.5%	16.7%
Member of the local diabetes associationb	18.3%	54.6%	12.7%
Current smoking	18.4%	14.0%	19.6%
Physically inactive	31.0%	29.6%	32.0%
Type of diabetes			
Type 1	13.6%	-	-
Type 2	83.3%	-	-
Undetermined	3.1%	-	-
Type of treatment			
Oral antidiabetics	42.6%	0.0%	50.8%
Insulin or other antidiabetic injection	57.5%	100%	49.3%

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 3, December 2023

Self-reported health			
Excellent/very good	14.9%	21.4%	14.4%
Good	61.3%	64.3%	60.6%
Medium/poor	23.8%	14.3%	25.0%

type 2 diabetes, 57.5% received insulin or other anti-diabetic injections. 18.4% smoked, 31% were sedentary, and 18.3% were local diabetes organization members.

Prevalence of eye conditions

As indicated in Table, respondents had several eye illnesses. In addition to basic visual impairments such myopia, hyperopia, astigmatism, and presbyopia, cataract was the most prevalent eye condition (35.8%). Only 14.2% of patients had diabetic retinopathy, a microvascular consequence of diabetes, compared to 12.6% for glaucoma. However, type 1 diabetics reported higher retinopathy than type 2 diabetics (40.9% vs. 9.8%). Laser treatment cured 75.6% of diabetic retinopathy cases, followed by intraocular injection (26.8%) and surgery (19.5%). Type 2 diabetes patients reported not being treated for diabetic retinopathy up to 16%, but type 1 patients did not. We found that individuals with type 1 diabetes had higher rates of various eye illnesses (≥3 diseases: 20.9% vs. 4.7%).

Diabetic eye disease awareness

Most patients (96.0%) knew that diabetes might harm the eyes; all type 2 diabetics and 95.1% of type 2 diabetics knew this.

Exploratory analyses: Factors associated with patients' awareness score

In exploratory linear regression analyses of patients' knowledge regarding diabetic eye disease prevention, only one variable was connected with awareness: eye examination in the last two years ($p = 0.005$). The other seven model variables age, gender, education, type of diabetes, length of diabetes at recruitment, local diabetes organization membership, and diabetic retinopathy had no relationship.

IV. DISCUSSION

In this research, we examined diabetes patients' eye disease prevalence, knowledge, and habits, as well as obstacles and facilitators to frequent eye exams. We found eye disorders common, particularly in type 1 individuals.

Table Barriers and facilitators to regular eye examination by an ophthalmologista

	%	[CI 95%]
Facilitatorsb	(n = 305)	
Recommendation of healthcare professionals	54.8%	[49.1%–60.4%]
Recommendation of relatives	2.3%	[0.6%–4.0%]
Feeling obliged to do it	9.8%	[6.5%–13.2%]
Knowledge of its importance	38.0%	[32.6%–43.5%]
Knowledge of the risks of a diabetes-related affection of the retina	33.8%	[28.4%–39.1%]
Knowledge of the treatment options	11.8%	[8.2%–15.4%]
Fear of having their eyes affected	22.3%	[17.6%–27.0%]
Having another eye problem necessitating an ophthalmologic follow-up	14.4% (n = 70)	[10.5%–18.4%]
Barriersc		
No recommendation from the family physician or diabetologist	30.0%	[19.0%–41.0%]
No information about diabetic eye diseases	7.1%	[1.0%–13.3%]
No information about retinal screening	2.9%	[1.1%–6.9%]

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 3, December 2023

No time	10.0%	[2.8%–17.2%]
Financial reasons	4.3%	[−0.6%–9.1%]
Too many other examinations and medical appointments	4.3%	[−0.6%–9.1%]
Fear of the examination, result or treatment	1.4%	[−1.4%–4.3%]
Fear of losing their driving license	0.0%	-
Discomfort during the examination (eye drops, dilated pupils)	1.4%	[−1.4%–4.3%]
Difficulty to find an ophthalmologist	4.3%	[−0.6%–9.1%]
Difficulty to go to the ophthalmologist's practice	4.3%	[−0.6%–9.1%]
No symptoms or vision problems	32.9%	[21.6%–44.1%]
Belief that it is not necessary because diabetes is well controlled	30.0%	[19.0%–41.0%]

Diabetes and eye diseases

Diabetics may develop retinopathy [4], cataract [5], and glaucoma [34]. [6] Epidemiological studies have shown that type 1 diabetes patients were more likely to develop retinal complications than type 2 diabetics: up to 50% of type 1 diabetics and 30% of type 2 diabetics developed potentially vision-threatening retinal changes [35]. In our research, 40.9% of type 1 diabetics and 9.8% of type 2 diabetics developed diabetic retinopathy, the main cause of visual loss in persons aged 20–74 [36]. Different possibilities might explain this disparity as 30% of type 2 diabetics have diabetic retinopathy [37]. One possibility is that diabetic retinopathy is underestimated since some individuals had no eye test last year. Inconsistency may also be due to inadequate diabetic retinopathy status knowledge, as revealed in earlier research [25, 27]. Additionally, patients' subjective history of diabetic retinopathy may underestimate retinopathy prevalence [38]. Since most participants with diabetic retinopathy also received ocular treatment, we may hypothesize that some participants falsely assume they only have diabetic retinopathy when treatment is needed, such as in the presence of proliferative or macular edema, leading them to underreport simple diabetic retinopathy. Another possibility is that patients don't comprehend what specialized doctors do and say during/after eye exams, therefore they're unaware of their eye ailments. The correlation between patient and physician-reported yearly eye and foot exams suggests this [39].

The last explanation could be that our sample is not representative of the population of patients with diabetes.

In addition, 35.8% of participants and 40.9% of type 1 diabetes patients had cataracts, despite their lower mean age (57.4 years vs. 68.1 years for type 2 diabetes patients). Diabetics are 2–5 times more likely to develop cataract than non-diabetics [40–42]. Diabetes individuals develop cataracts early, causing vision loss that affects the working population [5].

Finally, one in ten patients reported glaucoma, which is consistent with recent evidence that diabetes increases the risk of glaucoma [6], though some authors disagree [35]. Diabetic individuals should get a basic glaucoma screening during their normal eye checkup because to this non-negligible proportion. As glaucoma develops quietly and may cause permanent and severe vision loss if left untreated, diabetes education should encompass all serious diabetic eye illnesses, not only diabetic retinopathy.

Awareness regarding diabetic eye diseases

In this research, virtually all diabetics knew diabetes may harm their eyes, which is consistent with high-income country studies. Schmid et al. found that 96% of Australian diabetics knew diabetes might cause vision loss [43], while more than 98% of Japanese type 2 diabetics knew it may cause eye impairment [27].

Interestingly, our exploratory analysis showed that ophthalmologist eye exams in the last 2 years were substantially related with greater diabetic eye disease knowledge. This is expected as thorough eye exams usually include teaching about ocular complications and preventative strategies. These results argue for frequent eye exams by an eye professional.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 3, December 2023

Practices: Frequency of eye examination

Despite significant knowledge of diabetic eye diseases, one third and one eighth of participants did not have an ophthalmologist-performed eye exam in the prior 12 and 24 months, respectively. This discrepancy raises the issue of why people don't report more eye exams. Our investigation of frequent eye exam obstacles and facilitators gave solutions. Whether or whether patients have ocular symptoms or uncontrolled diabetes, an annual eye checkup is recommended since retinopathy may progress slowly [44]. However, one third of our poor screening participants thought only ocular symptoms warranted an eye exam and one third thought stable diabetes was adequate to avoid diabetic eye problems. Others have observed similar effects, with patients bypassing exams because they thought they didn't have diabetic retinopathy [27]. Patients seem to neglect the preventative component of routine eye exams, thus healthcare professionals should emphasize this in the future.

One third of participants reported inadequate eye inspection due to the lack of physician (family physician or diabetologist) advice. Physicians may be able to improve practices. Physicians must reinforce prevention messages because patient education and eye health recommendations have been shown to increase screening guidelines adherence [38, 45]. Knowing that doctors may improve screening rates by referring patients to eye specialists may improve outcomes [39, 46].

Given that the number of patients with preventable eye diseases is rising and that diabetic eye disease screening is one of the most cost-effective medical interventions in ophthalmology, efforts to improve screening adherence are warranted [46]. Patients and healthcare providers must learn screening protocols to attain this aim.

Strengths and limitations

Our study's strengths lie in its ability to examine eye disease prevalence, awareness, and practices in a population-based cohort of diabetics, in contrast to previous studies that focused on ophthalmic consultations and diabetic retinopathy. Also, it considered various important diabetes care metrics and outcomes. The following limitations must be considered when interpreting our findings. They used patient self-reported data, which may be subject to memory and desirability bias. Patients and physicians reported similar results in prior Codiab-VD cohort studies [47]. Additionally, self-reported patient-centered outcomes are increasingly important in evaluating patient treatment and should be employed. Second, although CoDiab-VD participants may not be representative of the general diabetes population, they appeared to have similar characteristics to those of other studies in the same region [48, 49].

V. CONCLUSION

In conclusion, diabetic eye disease knowledge was high in Vaud, Switzerland, patients, but screening methods should be improved. Patients' barriers showed their ignorance of screening standards, particularly eye exam prevention. Thus, diabetes-related ocular screening recommendations for patients and healthcare providers should be promoted to eliminate patient misperceptions, assist them adjust habits for early disease diagnosis, and prevent sight-threatening consequences.

REFERENCES

[1]. Zhou BLY, Hajifathalian K, Bentham J, Di Cesare M, Danaei G, Bixby H. Worldwide trends in diabetes since 1980: a pooled analysis of 751 population-based studies with 4.4 million participants. Lancet (London England). 2016;387(10027):1513–30. https://doi.org/10.1016/s0140- 6736(16)00618-8.

[2]. International-Diabetes-Federation. Diabetes Atlas. 2015.

[3]. Forbes JM, Cooper ME. Mechanisms of diabetic complications. Physiol Rev. 2013;93(1):137–88. https://doi.org/10.1152/physrev.00045.2011.

[4]. Ting DS, Cheung GC, Wong TY. Diabetic retinopathy: global prevalence, major risk factors, screening practices and public health challenges: a review. Clinical & experimental ophthalmology. 2016;44(4):260–77. https:// doi.org/10.1111/ceo.12696.

[5]. Javadi MA, Zarei-Ghanavati S. Cataracts in diabetic patients: a review article. Journal of ophthalmic & vision research. 2008;3(1):52–65.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 3, December 2023

[6]. Song BJ, Aiello LP, Pasquale LR. Presence and risk factors for glaucoma in patients with diabetes. Current diabetes reports. 2016;16(12):124. https://doi. org/10.1007/s11892-016-0815-6.

[7]. Shaw JE, Sicree RA, Zimmet PZ. Global estimates of the prevalence of diabetes for 2010 and 2030. Diabetes Res Clin Pract. 2010;87(1):4–14. https:// doi.org/10.1016/j.diabres.2009.10.007.

[8]. Sabanayagam C, Yip W, Ting DS, Tan G, Wong TY. Ten emerging trends in the epidemiology of diabetic retinopathy. Ophthalmic Epidemiol. 2016;23(4): 209–22. https://doi.org/10.1080/09286586.2016.1193618.

[9]. Shukla R, Gudlavalleti MV, Bandyopadhyay S, et al. Perception of care and barriers to treatment in individuals with diabetic retinopathy in India: 11-city 9-state study. Indian journal of endocrinology and metabolism. 2016; 20(Suppl 1):S33–41. https://doi.org/10.4103/2230-8210.179772.

[10]. Al Zarea BK. Knowledge, Attitude and Practice of Diabetic Retinopathy amongst the Diabetic Patients of AlJouf and Hail Province of Saudi Arabia. Journal of clinical and diagnostic research : JCDR. 2016; 10(5):Nc05–8. doi: https://doi.org/10.7860/jcdr/2016/19568.7862

[11]. Kizor-Akaraiwe NN, Ezegwui IR, Oguego N, Uche NJ, NA I, Shiweobi J. Prevalence, awareness and determinants of diabetic retinopathy in a screening Centre in Nigeria. J Community Health. 2016;41(4):767–71. https:// doi.org/10.1007/s10900-016-0151-4.

[12]. Hussain R, Rajesh B, Giridhar A, et al. Knowledge and awareness about diabetes mellitus and diabetic retinopathy in suburban population of a south Indian state and its practice among the patients with diabetes mellitus: a population-based study. Indian J Ophthalmol. 2016;64(4):272–6. https://doi.org/10.4103/0301-4738.182937.

[13]. Thapa R, Bajimaya S, Paudyal G, et al. Population awareness of diabetic eye disease and age related macular degeneration in Nepal: the Bhaktapur retina study. BMC Ophthalmol. 2015;15:188. https://doi.org/10.1186/s12886-015-0175-z.

[14]. Islam FM, Chakrabarti R, Islam SZ, Finger RP, Critchley C. Factors associated with awareness, attitudes and practices regarding common eye diseases in the general population in a Rural District in Bangladesh: the Bangladesh population-based diabetes and eye study (BPDES). PLoS One. 2015;10(7): e0133043. https://doi.org/10.1371/journal.pone.0133043.

[15]. Liu L, Chen L. Awareness of diabetic retinopathy is the key step for early prevention, diagnosis and treatment of this disease in China. Patient Educ Couns. 2014;94(2):284–5. https://doi.org/10.1016/j.pec.2013.10.026.

[16]. Cetin EN, Zencir M, Fenkci S, Akin F, Yildirim C. Assessment of awareness of diabetic retinopathy and utilization of eye care services among Turkish diabetic patients. Primary care diabetes. 2013;7(4):297–302. https://doi.org/ 10.1016/j.pcd.2013.04.002.

[17]. Thapa R, Paudyal G, Maharjan N, Bernstein PS. Awareness of diabetic retinopathy among diabetic patients in Nepal. Acta Ophthalmol. 2012;90(3): e242. https://doi.org/10.1111/j.1755-3768.2011.02163.x.

[18]. Tajunisah I, Wong P, Tan L, Rokiah P, Reddy S. Awareness of eye complications and prevalence of retinopathy in the first visit to eye clinic among type 2 diabetic patients. International journal of ophthalmology. 2011;4(5):519–24. https://doi.org/10.3980/j.issn.2222-3959.2011.05.12.

[19]. Addoor KR, Bhandary SV, Khanna R, et al. Assessment of awareness of diabetic retinopathy among the diabetics attending the peripheral diabetic clinics in melaka, malaysia. Med J Malaysia. 2011;66(1):48–52.

[20]. Muecke JS, Newland HS, Ryan P, et al. Awareness of diabetic eye disease among general practitioners and diabetic patients in Yangon, Myanmar. Clinical & experimental ophthalmology. 2008;36(3):265–73. https://doi.org/ 10.1111/j.1442-9071.2008.01724.x.

[21]. Silver K, Williams M, Macario E. The National eye Health Education Program: increasing awareness of diabetic eye disease among American Indians and Alaska natives. Ethnicity & disease. 2006;16(4):920–5.

[22]. Caliskan D, Ozdemir O, Ocaktan E, Idil A. Evaluation of awareness of diabetes mellitus and associated factors in four health center areas. Patient Educ Couns. 2006;62(1):142–7. https://doi.org/10.1016/j.pec.

[23]. 2005.06.018.

[24]. Verma L, Elankumaran P, Prakash G, Venkatesh P, Tewari HK. Awareness of diabetic retinopathy among diabetics. Indian J Ophthalmol. 2002;50(4):355.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 3, December 2023

[25]. Trento M, Bajardi M, Borgo E, et al. Perceptions of diabetic retinopathy and screening procedures among diabetic people. Diabetic medicine : a journal of the British Diabetic Association. 2002;19(10):810–3.

[26]. Bressler NM, Varma R, Doan QV, et al. Underuse of the health care system by persons with diabetes mellitus and diabetic macular edema in the United States. JAMA ophthalmology. 2014;132(2):168–73. https://doi.org/10. 1001/jamaophthalmol.2013.6426.

[27]. Huang OS, Tay WT, Ong PG, et al. Prevalence and determinants of undiagnosed diabetic retinopathy and vision-threatening retinopathy in a multiethnic Asian cohort: the Singapore epidemiology of eye diseases (SEED) study. Br J Ophthalmol. 2015;99(12):1614–21. https://doi.org/10.1136/ bjophthalmol-2014-306492.

[28]. Funatsu H, Hori S, Shimizu E, Nakamura S. Questionnaire survey on periodic ocular examination in Japanese diabetic patients. Am J Ophthalmol. 2003; 136(5):955–7.

[29]. Javitt JC, Aiello LP. Cost-effectiveness of detecting and treating diabetic retinopathy. Ann Intern Med. 1996;124(1 Pt 2):164–9.

[30]. Paterson B, Thorne S. Developmental evolution of expertise in diabetes self- management. Clin Nurs Res. 2000;9(4):402–19.

[31]. Colagiuri R. The optometrist's role in the multidisciplinary diabetes team: towards a more holistic approach. Clinical & experimental optometry. 1999; 82(2–3):55–8.

[32]. Peytremann-Bridevaux I, Bordet J, Santschi V, Collet TH, Eggli M, Burnand B. Community-based pharmacies: an opportunity to recruit patients? International journal of public health. 2013; https://doi.org/10.1007/s00038- 012-0383-8.

[33]. Zuercher E, Bordet J, Burnand B, Peytremann-Bridevaux I. CoDiab-VD: protocol of a prospective population-based cohort study on diabetes care in Switzerland. BMC Health Serv Res. 2015;15:329. https://doi.org/10.1186/ s12913-015-0991-0.

[34]. Ichhpujani P, Bhartiya S, Kataria M, Topiwala P. Knowledge, attitudes and self-care practices associated with glaucoma among hospital personnel in a tertiary Care Center in North India. Journal of current glaucoma practice. 2012;6(3):108–12. https://doi.org/10.5005/jp-journals-10008-1116.

[35]. Khan A, Petropoulos IN, Ponirakis G, Malik RA. Visual complications in diabetes mellitus: beyond retinopathy. Diabetic medicine : a journal of the British Diabetic Association. 2016; https://doi.org/10.1111/dme.13296.

[36]. Sayin N, Kara N, Pekel G. Ocular complications of diabetes mellitus. World J Diabetes. 2015;6(1):92–108. https://doi.org/10.4239/wjd.v6.i1.92.

[37]. Cheung N, Tikellis G, Wang JJ. Diabetic retinopathy. Ophthalmology. 2007; 114(11):2098–2099; author reply 9. https://doi.org/10.1016/j.ophtha.2007.07.010.

[38]. Nentwich MM, Ulbig MW. Diabetic retinopathy - ocular complications of diabetes mellitus. World J Diabetes. 2015;6(3):489–99. https://doi.org/10. 4239/wjd.v6.i3.489.

[39]. Sundling V, Gulbrandsen P, Jervell J, Straand J. Care of vision and ocular health in diabetic members of a national diabetes organization: a cross- sectional study. BMC Health Serv Res. 2008;8:159. https://doi.org/10.1186/ 1472-6963-8-159.

[40]. Schoenfeld ER, Greene JM, SY W, Leske MC. Patterns of adherence to diabetes vision care guidelines: baseline findings from the diabetic retinopathy awareness program. Ophthalmology. 2001;108(3):563–71.

[41]. Klein BE, Klein R, Moss SE. Prevalence of cataracts in a population-based study of persons with diabetes mellitus. Ophthalmology. 1985;92(9):1191–6.

[42]. Klein R, Klein BE, Moss SE. Visual impairment in diabetes. Ophthalmology. 1984;91(1):1–9.

[43]. Klein BE, Klein R, Moss SE. Incidence of cataract surgery in the Wisconsin epidemiologic study of diabetic retinopathy. Am J Ophthalmol. 1995;119(3):295–300.

[44]. Schmid KL, Schmid LM, Pedersen C. Knowledge of the ocular effects of diabetes among the general population of Australia and the members of Diabetes Australia. Clinical & experimental optometry. 2003;86(2):91–103.

[45]. Diabetic Retinopathy Preferred Practice Patterns - Updated 2016 [database on the Internet]2016. Available from: https://www.aao.org/preferred- practice-pattern/diabetic-retinopathy-ppp-updated-2016.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 3, December 2023

[46]. Dervan E, Lillis D, Flynn L, Staines A, O'Shea D. Factors that influence the patient uptake of diabetic retinopathy screening. Ir J Med Sci. 2008;177(4): 303–8. https://doi.org/10.1007/s11845-008-0192-5.

[47]. Fathy C, Patel S, Sternberg P, Jr., Kohanim S. Disparities in adherence to screening guidelines for diabetic retinopathy in the United States: a comprehensive review and guide for future directions. Semin Ophthalmol 2016; 31(4):364–377. doi:https://doi.org/10.3109/08820538.2016.1154170.

[48]. Collet TH, Taffe P, Bordet J, Burnand B, Peytremann-Bridevaux I. Reproducibility of diabetes quality of care indicators as reported by patients and physicians. Eur J Pub Health. 2014;24(6):1004–9. https://doi.org/10.1093/ eurpub/cku011.

[49]. Kaiser A, Vollenweider P, Waeber G, Marques-Vidal P. Prevalence, awareness and treatment of type 2 diabetes mellitus in Switzerland: the CoLaus study. Diabetic medicine : a journal of the British Diabetic Association. 2012;29(2): 190–7. https://doi.org/10.1111/j.1464-5491.2011.03422.x.

[50]. Sebo P, Abetel G, STalder H, Bovier PA. Importance of lifestyle counseling by primary care physicians for diabetic patients. Swiss Med Wkly. 2006;136:566–73.