Original Article

Profile of sight-threatening diabetic retinopathy and its awareness among patients with diabetes mellitus attending a tertiary care center in Kashmir, India

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Purpose: To study the profile of sight-threatening diabetic retinopathy (STDR), its association with various factors affecting it, and awareness of diabetic retinopathy (DR) among patients with diabetes mellitus (DM) attending a tertiary care center in Kashmir. **Methods:** In this prospective cross-sectional study, 625 consecutive patients with DM were assessed for STDR. Demographic/clinical data were obtained. Early treatment diabetic retinopathy study (ETDRS) criteria were used to grade fundus photographs. Severe nonproliferative DR, proliferative DR, and/or macular edema were classified as STDR. Optical coherence tomography was used to confirm the diagnosis of macular edema. **Results:** The mean age of patients was 56.36 ± 9.29 years. The male-to-female ratio was 0.92:1. The majority (99.36%) of patients had type 2 DM. STDR was seen in 208 (33.28%) patients. Non-sight-threatening diabetic retinopathy (NSTDR) was seen in 173 (27.68%) patients. Eye care was sought by 313 (50.08%) patients for the first time. STDR had a significant association with difficulty in accessing the health care facilities, duration of diabetes, uncontrolled diabetes, presence of other diabetes complications, use of insulin, and hypertension ($P < 0.05$ for all). Awareness that diabetes can affect eyes showed a significant association with age, gender, educational status, duration of diabetes, glycemic status, DR, and STDR ($P < 0.001$ for all). **Conclusion:** STDR is a common complication in diabetes and is duration- and glycemic control-dependent. Understanding the factors associated with STDR can help in making strategies for its prevention. Spreading awareness regarding STDR at the community level in the Kashmir valley is crucial in this regard.

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Diabetes mellitus (DM) imposes a tremendous burden on healthcare and economies worldwide, with projections of 552 million patients by 2030.[1] India will have approximately 80 million diabetics by 2030.[2] Uncontrolled diabetes leads to significant macrovascular and microvascular complications.[3,4]

Diabetic retinopathy (DR) is a well-known microvascular complication of diabetes.[5] Globally, DR is the commonest cause of blindness in working-age populations.[6,7] Approximately 2.6% of global blindness is attributed to DR.[8] In 2020, DR accounted for approximately 3.2 million visually impaired and blind people globally.[9] In India, the prevalence of DR ranges from 7.3% to 26.2%.[10-15]

Patients with diabetes continue to suffer from impaired visual performance before the appearance of overt damage to the retinal microvasculature and subsequent sight-threatening complications.[16] DR is associated with a longer diabetic duration, higher glycosylated hemoglobin (HbA1c), higher systolic blood pressure (SBP), lower body mass index, and raised blood urea concentration.[17]

The Early Treatment of Diabetic Retinopathy Study (ETDRS) scale is commonly used to classify DR into two stages based on the extent of microvascular damage and ischemia.[18] These are nonproliferative diabetic retinopathy (NPDR) and the more advanced, proliferative diabetic retinopathy (PDR). NPDR can be subclassified into mild, moderate, and severe NPDR. Fundus findings in the nonproliferative stage include microaneurysms, intraretinal hemorrhages, cotton wool spots, venous abnormalities, and intraretinal microvascular abnormalities. PDR is a serious condition that encompasses neovascularization of the retina, optic disc, and/or angle, and advanced eye diseases such as vitreous hemorrhage, rubeosis, and tractional retinal detachment. The ETDRS also defined clinically significant macular edema (CSME), which is caused due to vascular leakage and is a major cause of decreased vision in these patients.[19]

Sight-threatening diabetic retinopathy (STDR) comprises severe NPDR, PDR (including advanced diabetic disease), or CSME.[5] Despite therapeutic advances, the management of DR remains challenging. Newer interventional modalities include intravitreal vascular endothelial growth factor inhibitors and intravitreal steroids such as triamcinolone, dexamethasone, and fluocinolone. Steroids can be given intravitreally as injections or inserted as long-term implants.[20-23] The introduction of

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optical coherence tomography (OCT) and fundus fluorescein angiography (FFA) has also revolutionized the management of DR. For PDR, pan-retinal photocoagulation remains a mainstay therapy, although it is an inherently destructive procedure.[24]

A study done in India to assess awareness about diabetes reported that approximately 50% of the participants had not even heard about diabetes.[25] Increasing the awareness about diabetes complications is the first step toward the prevention of visual impairment due to diabetes and possibly also in preventing other diabetes complications.[26]

Despite DR being a common cause of visual loss in India, hardly any data is available regarding DR from Kashmir. Therefore, this study was aimed at studying the profile of STDR, its association with various factors affecting it, and awareness about the effects of diabetes on the eye in patients with DM attending a tertiary care hospital in Kashmir, India.

Methods

In this prospective cross-sectional study performed at a tertiary care hospital in Srinagar, Kashmir, from January 2020 to June 2020, 625 consecutive patients were enrolled after obtaining informed consent from the patients or their relatives. Ethical clearance was obtained from the institutional ethical clearance committee.

The sample size was estimated to be 568, assuming the prevalence of DR as 31% among diabetic patients in Kashmir, precision error of 5%, and type 1 (α) error of 1%. It was increased to 625, keeping an additional margin of 10% for the dropouts, if any. Type 1 and type 2 diabetics presenting to the Ophthalmology outpatient department for eye check-ups were included in the study. Patients with advanced glaucoma, severe uveitis, mature cataract, and eye trauma were excluded. Data anonymization was achieved by protecting private or sensitive information by erasing or encrypting identifiers that connected an individual to stored data.

During the study, after the imposition of COVID-19-related restrictions in Kashmir valley toward the end of March 2020, appropriate guidelines such as using a personal protective equipment kit by doctors, use of face mask by the patients, and maintaining a safe distance were followed for examining the patients.

A detailed clinical history was taken and demographic data were obtained. All data were recorded on a proforma. The recruited patients were evaluated by two consultants from the investigating team. A complete ophthalmologic examination was done.

Best-corrected visual acuity (BCVA) was recorded as a Snellen visual acuity (VA). For statistical purposes, Snellen visual acuities were converted to logMAR equivalents. Blindness was defined as VA of <3/60 or a corresponding visual field loss of <10° in the better eye with the best possible correction.[27] Humphrey visual field analyzer was used for assessing visual fields, with a 10-2 testing strategy. Field assessment was performed only at presentation if the vision was equal to or better than 6/60. Patients with field loss due to laser photocoagulation but VA better than 3/60 were not categorized as blind. Anterior segment examination was performed on a slit-lamp microscope. Dilated (tropicamide, 0.5%) fundus examination was done for both the eyes using 90D lenses. Fundus photographs were taken using a Carl Zeiss Visupac FF450 + fundus camera (Germany) for multiple fields using a field of view of 50°. Fundus photographs were graded independently by two experienced ophthalmologists. Refraction was performed wherever possible using a Potec autorefractometer. Intraocular pressure (IOP) was measured using Goldmann applanation tonometry. We used OCT (Carl Zeiss Cirrus 5000 SD-OCT, Germany; Scan protocol: Macular cube, 512 × 128) for the confirmation of macular edema. FFA scan was done, wherever required.

The ETDRS classifications[18] were used for the grading of severity of retinopathy. Patients were classified as having STDR or non-sight-threatening diabetic retinopathy (NSTDR). STDR was defined as severe NPDR, PDR, and/or macular edema in at least one eye.[28,29] Mild and moderate NPDR (without macular edema) were included under the heading of NSTDR.[29]

Glycated hemoglobin (HbA1c) levels were checked on the same day of presentation. Diabetes was deemed as controlled if HbA1C values were <7%. Hypertension was defined as blood pressure (BP) of ≥130/80 mm Hg for conventional office-based measurement.[30] For labeling the patient as hypertensive, history and medical records were taken into consideration. All patients undergoing surgery were subjected to an RTPCR test for COVID-19. Treatment details were recorded.

A questionnaire in the Urdu language, aimed at exploring awareness and knowledge about diabetes and DR, was designed by taking into account the dimensionality of construct, the format of the questionnaire, and items and length of the questionnaire. A preliminary pilot testing was done. The questionnaire items were revised upon reviewing their results. Questions were translated into the Kashmiri language by investigators for the patients non-fluent in the Urdu language. An English version of the questionnaire was also prepared for patients knowing only English (online supplementary file). The answers to the questionnaire by illiterate people/those not knowing the language were reinterpreted by the first author. The questionnaire was standardized to ask all participants precisely the same questions in an identical format and record responses in a uniform manner.

Statistical analysis

The statistical analysis was performed using SPSS version 22. The Student's *t*-test was used for comparing the normally distributed quantitative data. Chi-square test/Fisher's exact test was used for comparing the categorical data and for testing the association between different variables. $P < 0.05$ was considered statistically significant.

Results

Baseline characteristics of patients with DM are shown in Table 1.

The majority (99.36%) of patients had type 2 DM. The male-to-female ratio was 0.92:1. The mean (± SD) age was 56.36 (±9.29) years (age range: 20–80 years). Patients aged more than 50 years accounted for 69.92% of all diabetics. Eighty-four (13.44%) patients had diabetes for ≥10 years. Diabetes was controlled in 59.52% (n = 372) patients.

Self-referral accounted for 55.68% (n = 348) patients, while 34.08% (n = 213) were physician referrals for fundus examination for diabetes and 10.24% (n = 64) were referred by ophthalmologists in rural areas.

There was a significant association of age, gender, residence, duration of diabetes, use of insulin, uncontrolled diabetes, presence of other diabetes complications (diabetic nephropathy,

Table 1: Baseline characteristics of patients with diabetes mellitus (*n*=625)

Parameter	Number of patients	Percentage
Age		
<30 years	4	0.64
31-50 years	184	29.44
51-70 years	412	65.92
>70 years	25	4.00
Gender		
Male	300	48.00
Female	325	52.00
Residence[a]		
Rural	306	48.96
Urban	319	51.04
Socioeconomic status[b]		
High	40	6.40
Middle	502	80.32
Low	83	13.28
Literacy status[c]		
Literate	301	48.16
Illiterate	324	51.84
Smoking status		
Smokers	163	26.08
Nonsmokers	462	73.92
Systemic diseases		
Hypertension		
Present	168	26.88
Absent	457	73.12
Type of diabetes		
Type 1	4	0.64
Type 2	621	99.36
Treatment being received		
Insulin only	84	13.44
Combination of insulin and OHAs	72	11.52
Combination of diet, exercise, and drugs	469	75.04

[a]Residence was defined as urban for all places with a municipality, corporation, cantonment board or notified town area committee and all other places meeting the criteria of a minimum population of 5000, at least 75 percent of the male main workers engaged in non-agricultural pursuits and a density of population of at least 400 per sq. km. All areas not categorized as the urban area were considered as rural areas; [b]Socioeconomic status: High (annual income >Rs. 8,50,000), middle (annual income Rs. 50,000-8,50,000) and low (annual income <Rs. 50,000); [c]Literate: A person was deemed as literate if he/she could read and write with understanding in any language. A person who could read but could not write was not considered literate; OHA- Oral hypoglycemic agent

neuropathy, and coronary artery disease [CAD]), and hypertension with DR ($P < 0.05$ for all). STDR had a significant association with difficulty in accessing the health care facilities, duration of diabetes, uncontrolled diabetes, presence of other diabetes complications (diabetic nephropathy and CAD), use of insulin, and hypertension ($P < 0.05$ for all) [Table 2].

An inter-observer agreement of 92% was seen regarding grading of the fundus abnormalities. Seventy-one photographs were excluded because of poor quality.

Mild to moderate DR (without macular edema) or NSTDR was seen in 173 (27.68%) patients. STDR was seen in 208 (33.28%) patients [Fig. 1]. Table 3 shows the clinical profile of patients with STDR. Of all patients with STDR, 76 (36.54%) patients had VA of <3/60 in at least one eye. Treatment for the eyes in the form of intravitreal injections, laser, or surgery was received by 124 (59.61%) patients. Intravitreal injections of bevacizumab were planned further for 41.82% (n = 87) of these patients; 64 of these were first-time visitors. Of 253 uncontrolled diabetics, 188 (64.30%) had STDR. Of 84 patients with diabetes for ≥10 years, 44 (52.38%) had STDR. Of the remaining 541 patients with a lesser duration of diabetes, 164 (30.31%) had STDR.

For patients with STDR, the mean logMAR VA was 0.76 ± 0.52 in the better eye and 1.35 ± 0.83 in the worse eye. For patients with NSTDR, the mean logMAR VA in the better eye was 0.31 ± 0.28 and 0.39 ± 0.21 in the worse eye. Mean HbA1c values for STDR and NSTDR were 8.67% and 6.99%, respectively.

Difficulty in accessing health facilities was quoted by 55.76% (n = 116) of patients with STDR. There was a lack of explanation of the disease by health practitioners as per 61.92% (387/625) of respondents. These were the main reasons for late presentation to the ophthalmologist for screening for DR. Thirty-two patients with STDR experienced an improvement in vision after interventions such as intravitreal bevacizumab and vitrectomy.

Some form of DR was seen in 60.96% (n = 381) of patients. Yet, 61.28% (n = 383) patients said they were unsure whether diabetes affected eyes or they had not been advised about regular eye checkups. Of 312 regular patients, 37.82% (n = 118) were unaware that diabetes affects eyes, despite at least one visit to the ophthalmologist. Lack of knowledge regarding diabetes causing blindness was reported by 42.24% (n = 264) patients.

Of the total patients, 313 (50.08%) were seeking eye care the first time. Of these, 177 (56.55%) patients already had some form of DR, 80 (25.55%) had STDR while 282 (90.09%) were unaware if DM affected eyes. Eye care due to visual or other eye-related complaints was sought by 56.23% (n = 176) of first-time visitors; while 32.27% (n = 101) were referred for fundus examination by the treating physicians. Blood sugar levels were perceived as controlled by 465 (74.4%) patients, while 372 (59.52%) patients demonstrated controlled values of HbA1c [Table 4].

Awareness that diabetes can affect eyes showed a significant association with age, gender, educational status, duration of diabetes, glycemic status, DR, and STDR ($P < 0.001$ for all). Awareness that diabetes can cause blindness showed a significant association with age, duration of diabetes, glycemic status, and DR ($P < 0.0001$ for all) [Table 5].

Discussion

We observed that 60.96% of diabetic patients had DR, 27.68% had NSTDR, and 33.28% had STDR. Previous data from India has focused on prevalence patterns in the community setting, mainly in the southern and western states. A major pan-India study estimated the prevalence of DR in India at 21.7% and found positive associations between diabetes and male gender, duration of diabetes more than 5 years, age above 40 years, use of insulin, and history of vascular accidents.[31] A higher frequency of DR among our diabetic patients is due to methodical differences as we determined DR/STDR in patients visiting the hospital for ophthalmic complaints while prevalence has been calculated in the aforementioned study.

In our study, despite a high prevalence of DR, the risk factors associated with DR were the same. A significant association between DR and other diabetes complications

Table 2: Profile of diabetic retinopathy and factors associated with its threat to sight

Parameter	DR (*n*=381)		*P*	STDR (*n*=208)	NSTDR (*n*=173)	*P*
	Present *n*=381	Absent *n*=244				
Age						
<30 years	4	0	<0.0001****	4	0	0.162
31-50 years	75	109		36	39	
51-70 years	281	131		155	126	
>70 years	21	4		13	8	
Gender						
Male	204	96	0.0007***	110	94	0.862
Female	177	148		98	79	
Literacy status						
Literate	194	107	0.100	92	102	0.603
Illiterate	187	137		116	71	
Residence						
Rural	225	81	<0.0001****	122	103	0.916
Urban	156	163		86	70	
Socioeconomic status						
High	28	12	0.117	15	13	0.477
Middle	296	206		166	130	
Low	57	26		27	30	
Smoking status						
Smokers	89	74	0.061	51	38	0.626
Non-smokers	292	170		157	135	
Difficulty in accessing the health care facilities						
Yes	194	103	0.055	116	78	0.048*
No	187	141		92	95	
Duration of diabetes						
≤10 years	321	220	0.046*	164	157	0.002**
>10 years	60	24		44	16	
Use of Insulin						
Yes	132	24	<0.0001****	88	44	0.0008***
No	249	220		120	129	
Control of diabetes						
Controlled	130	242	<0.0001****	20	110	<0.0001****
Uncontrolled	251	2		188	63	
Other diabetic complications						
Nephropathy						
Present	24	0	<0.0001****	22	2	0.0003***
Absent	357	244		186	171	
Neuropathy						
Present	23	0	0.0001***	17	6	0.088
Absent	358	244		191	167	
CAD						
Present	58	11	<0.0001****	40	18	0.024*
Absent	323	233		168	155	
Systemic diseases						
Hypertension						
Present	137	31	<0.0001****	60	77	0.002**
Absent	244	213		148	96	

DR - Diabetic retinopathy; STDR - Sight-threatening diabetic retinopathy; NSTDR - Non-sight-threatening diabetic retinopathy; CAD - Coronary artery disease

such as neuropathy, nephropathy, and CAD is in agreement with the abovementioned study,[31] which is further supported by a significant association of STDR with other diabetes complications such as nephropathy and CAD. Using DR to predict the onset of other diabetes complications or vice versa was not possible based on our study findings as it was only a cross-sectional study. However, DR has been reported as an independent risk factor for cardiovascular diseases and cardiovascular mortality in previous studies.[32]

Like the Chennai Urban Rural Epidemiology Study (CURES)[11] and the UK Prospective Diabetes Study (UKPDS),[33] we found a significant association between DR and poor glycemic control. Duration of diabetes was significantly associated with the development of DR ($P = 0.046$), as also seen in another study.[34] It implies that poor glycemic control leads to the development of DR that can worsen with time.

We also observed a significant association between coexisting hypertension and DR as well as STDR, which

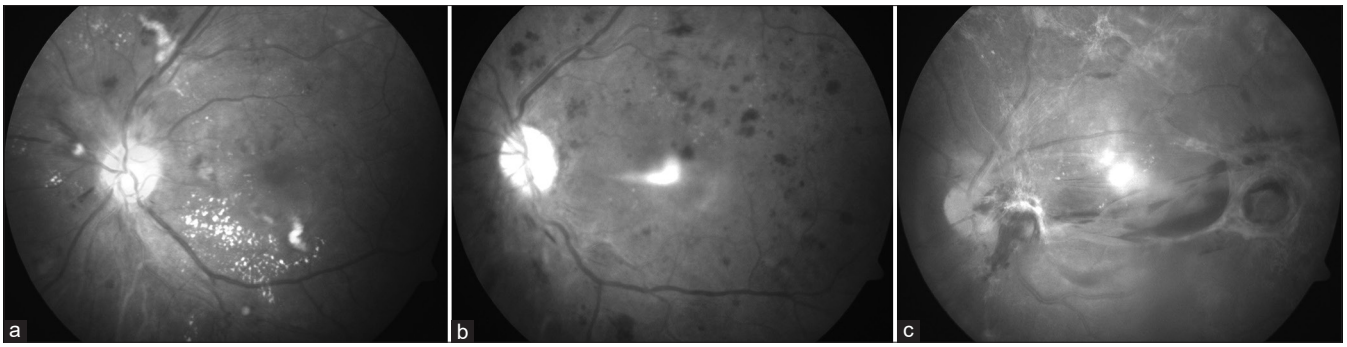

Figure 1: Fundus photographs of patients with diabetic retinopathy. These patients were unaware of the effects of diabetes on the eye. (a) Moderate NPDR showing scattered flame-shaped hemorrhages and cotton wool spots, with exudates, present inferiorly in the perifoveal area; (b) Severe NPDR showing hemorrhages in all quadrants. An artifact is present centrally; (c) Advanced diabetic eye disease, showing extensive involvement of the posterior pole with fibrotic bands

Table 3: Clinical profile of patients with sight-threatening diabetic retinopathy (*n*=208)

Feature	Number of patients	Percentage
Treatment History		
IVA	75	36.06
Laser	25	12.02
IVTA	10	4.80
Vitrectomy	14	6.73
Symptoms		
Diminution of vision	208	100
Blindness		
Unilateral	61	29.33
Bilateral	17	8.17
Signs		
Visual Acuity in the worse eye		
Severe visual impairment (6/60-3/60)	48	23.08
Blindness (<3/60)	76	36.54
*Visual Acuity in the better eye		
Severe visual impairment	34	16.35
Blindness	17	8.17
Severe NPDR	60	28.85
PDR	76	36.54
Maculopathy		
Present	196	94.23
Absent	12	5.77
Photocoagulation scars	25	12.02
Hemorrhage (Preretinal/intragel/both)	32	15.38
Retinal detachment	14	6.73
Rubeosis iridis	6	2.88
Other diabetic complications		
Diabetic nephropathy	22	10.58
Diabetic neuropathy	17	8.17
Coronary artery disease	40	19.23

IVA - Intravitreal Avastin injection; IVTA - Intravitreal Triamcinolone Acetonide injection; *12 patients had the same vision in both eyes; NPDR - Nonproliferative diabetic retinopathy; PDR - Proliferative diabetic retinopathy

Table 4: Awareness of diabetic retinopathy among all patients with DM (*n*=625)

Parameter	Number of patients	Percentage
Can diabetes affect the eyes?		
Yes	225	36.00
No	17	2.72
Don't know	383	61.28
Do you think your diabetes is controlled?		
Yes	465	74.40
No	96	15.36
Don't know	64	10.24
Can diabetes cause blindness?		
Yes	206	32.96
No	155	24.80
Don't know	264	42.24
Do you think eye check-ups are necessary?		
Yes	608	97.28
No	17	2.72
Don't know	0	0

highlights the importance of strict control of blood pressure in diabetics. Due to coexisting hypertension and diabetes in a significant number of patients, the presence of a significantly higher number of patients with DR than without DR and a higher number of patients with STDR than with NSTDR imply that the presence of hypertension in diabetic patients increases the risk of developing DR as well as loss of vision due to DR. This supports the findings of the UKPDS that aggressive BP control decreased the development of DR and subsequent blindness than less aggressive BP control.[35] As such, hypertension needs to be paid adequate attention in diabetic patients as its inadequate control may accelerate the rate of loss of vision due to DR.

Shah *et al.*[36] observed DR in 65% of around 6000 diabetics, NPDR in 28.58%, and PDR in 19.51% diabetics. Risk factors for DR observed by them, such as male gender, age >40 years, smoking, hypertension, poor glycemic control, and reluctance in using insulin, were also observed in our study except for smoking. Aggarwal *et al.*[37] reported NPDR in 79.8% of patients and PDR in 14.6% of patients in a hospital-based study like ours.

Sapkota *et al.*[29] observed at a specialist eye clinic in China that among the patients who significantly delayed the treatment for DR, 80% of patients had STDR and patients presented

Table 5: Association of various epidemiological and clinical factors with awareness regarding affection of eyes by diabetes

Parameter	Can diabetes affect the eyes?		P	Can diabetes cause blindness?		P
	Yes	No/Don't know		Yes	No/Don't know	
Age						
≤50 years	48	140	0.0004***	35	153	<0.0001****
>50 years	177	260		171	266	
Gender						
Males	136	164	<0.0001****	108	192	0.141
Females	89	236		98	227	
Educational status						
Literate	148	153	<0.0001****	104	197	0.466
Illiterate	77	247		102	222	
Duration of diabetes						
≤10 years	160	381	<0.0001****	158	383	<0.0001****
>10 years	65	19		48	36	
Glycemic status						
Controlled	104	268	<0.0001****	78	294	<0.0001****
Uncontrolled	121	132		128	125	
DR						
Present	177	204	<0.0001****	164	217	<0.0001****
Absent	48	196		42	202	
Type of DR						
STDR	97	111	<0.0001****	120	88	0.146
NSTDR	128	45		86	87	

DR - Diabetic retinopathy; STDR - Sight-threatening diabetic retinopathy; NSTDR - Non-sight-threatening diabetic retinopathy

with late-stage retinopathy with vision loss. Our figures of 208 (54.59%) patients having STDR out of 381 patients with DR are less in comparison.

Possible reasons for a high proportion of STDR in our study, as compared to community studies,[10-15] could be that our cohort was hospital-based, as people with diminution of vision were more likely to report to the hospital. Difficulty in accessing health facilities could be a major reason for the late presentation of patients with DR, besides other factors such as illiteracy, low socioeconomic status, and lack of explanation by the physician regarding the need for proper control of blood sugar. In addition, the inclusion of severe NPDR in our definition of STDR could have increased the number of patients with STDR. Moreover, macular edema was responsible for a large number of patients with STDR.

Given that a majority of patients showed a lack of awareness about diabetes complications, it is vital that patients be informed about the same during the early stages of the disease. A significant association of awareness regarding eyes being affected by diabetes with age, gender, educational status, duration of diabetes, glycemic status, DR, and STDR ($P < 0.001$ for all) is supported by another study from Jordan, which showed a significant association between awareness of DR and variables such as gender, education, literacy, and blood glucose control.[38] However, a significantly higher number of patients having awareness about the possibility of eyes being affected by diabetes in the DR group implies that these patients probably developed some awareness after having suffered from DR with or without loss of vision and not because they were more health-conscious.

The same logic applies to the presence of a higher number of diabetic patients having the awareness that diabetes can cause blindness among patients with advancing age, increasing duration of diabetes, uncontrolled glycemic status, and DR; this warrants a strong emphasis on proper control of diabetes.[29,39] Therefore, promoting the awareness and knowledge regarding the development of DR due to uncontrolled diabetes among diabetic patients can help in preventing the development of DR by motivating diabetic patients to ensure proper control of diabetes. Our findings also underscore the need for systematic screening of diabetics by ophthalmologists in time, preferably at diagnosis. In our study, 90% of first-time visitors did not know whether diabetes affected eyes. More worryingly, 37.82% of diabetics who had earlier visited the ophthalmologist were also unaware of eye-related complications from diabetes. A large part of our cohort was uneducated; this highlights the importance of awareness campaigns at the public health level. Patients should be encouraged to visit the ophthalmologist regularly according to need and as per recommendations.[40,41] This can be an effective measure toward prevention of DR as early diagnosis and early treatment for retinopathy can reduce the incidence of severe loss of vision in a high percentage of patients with STDR.[6,42] As such, early screening for DR with an efficient and scalable method is highly needed to reduce blindness,[43] which can be achieved only by promoting awareness and knowledge regarding diabetes and its sight-threatening complications at the community level, particularly among patients with diabetes.

Strengths and weaknesses

Our study is the first study assessing the awareness of DR among patients with DM from the Kashmir region. As our study was hospital-based, our data give a representative picture of the profile of DR and its awareness in the region, though it may be slightly biased for the community. Alcohol use was not evaluated for its association with DR for the threat to sight as alcohol is rarely consumed in the region on religious grounds.

Conclusion

STDR is a common complication of diabetes and is duration- and glycemic control-dependent. Understanding the factors associated with STDR can help in making strategies for its primary as well as secondary prevention in the Kashmir region. Spreading awareness regarding STDR at the community level is crucial in this regard.

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Research ethics and patient consent

The study was in accordance with the ethical standards of the responsible committee on human experimentation (institutional) and with the Helsinki Declaration of 1964, as revised in 2013 and was approved by the ethical clearance committee of Govt. Medical College, Srinagar, Jammu and Kashmir, India. Written informed consent was taken from all patients for their participation in the study.

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Conflicts of interest

There are no conflicts of interest.

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Supplementary file

Questionnaire for testing awareness regarding Diabetic retinopathy

Date:
Patient No.: _____
1. Sex: Male/Female
2. Age: _____

3. How long had you had diabetes for?
Up to 10 years
10–15 years
≥15 years

4. What type of diabetes do you have?
Type 1
Type 2
Don't know

5. How do you control your diabetes?
Using non-insulin treatment (Diet only/tablets/or both combined)
Using insulin treatment (insulin only or combining insulin with tablet or diet)

6. What is your literacy level?
Able to read and write in Urdu
Unable to read and write in Urdu
Able to converse only in Kashmiri or English

7. Do you smoke?
Yes
No

8. Do you think your diabetes is controlled?
Yes
No
Don't know
9. Can diabetes affect the eyes?
Yes
No
Don't know

10. Can diabetes cause blindness?
Yes
No
Don't know

11. Do you think eye checkups are necessary?
Yes
No
Don't know

12. Have you attended a diabetic eye examination previously?
Yes
No
Not sure

13. Have you had any treatment in the eye other than glasses (e.g. surgery and LASER) as a result of diabetes?
Yes
No
Not sure

14. Who referred you for ophthalmological treatment?
Self
Physician
Ophthalmologist in periphery