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Original Article

Ophthalmology Section

Quality of Life in People with Diabetic Retinopathy: Indian Study

DATSON MARIAN PEREIRA[1], AMISH SHAH[2], MAY D'SOUZA[3], PAUL SIMON[4], THOMAS GEORGE[5], NAMEETH D'SOUZA[6], SUCHARITHA SURESH[7], MANJESHWAR SHRINATH BALIGA[8]

ABSTRACT

Introduction: Diabetic Retinopathy (DR) is a well-known consequence of long standing and poorly controlled Diabetes Mellitus (DM). Several studies have demonstrated both a qualitative and quantitative reduction in health related quality of life in persons with DR. But no such study has been done in the Indian population.

Aim: To assess health related and vision related quality of life in people with DR.

Materials and Methods: The present study included two groups of patients with Type 1 and Type 2 diabetes. Cases included 97 patients with DR. The control group (n=26) consisted of diabetic cases with no clinically detectable DR changes. After taking informed consent, health and vision related quality of life was assessed using National Eye Institute 25-Item Visual Function Questionnaire (NEI-VFQ-25). Demographic information, social history and diabetic history were also obtained from all patients. DR was graded using the Early Treatment Diabetic Retinopathy Study (ETDRS) classification.

Results: Of the 97 cases with DR, 42.3% were females. Of the 26 controls, 53.8% were females. The mean±SD age in years of the cases was 55.09±9.56 and controls were 54.12±13.01. The mean±SD of DM in years for the cases was 10.98±5.62 and for controls was 6.69±2.29. There were statistically significant ($p<0.001$) lower VFQ-25 composite and sub scale scores of the cases when compared with controls. As the grade of DR increased, VFQ-25 sub-scale scores decreased and this was statistically significant for composite and all sub scales ($p<0.005$) except ocular pain. Mann-Whitney test Z-value was highest in general health, general vision, composite score and mental health.

Conclusion: Quality of life was significantly lower in diabetics with DR when compared with those without DR with maximum effect seen on general health, general vision and mental health. Quality of life decreased as the duration of retinopathy and severity of retinopathy increased.

Keywords: Ophthalmology, Vision disorders, Visual function questionnaire

INTRODUCTION

DM is one of the most important public health challenges of the 21st century and is considered by many as a global epidemic [1]. The prevalence of DM for all age groups worldwide was estimated to be 2.8% in 2000 and 4.4% in 2030. The total number of diabetics is projected to rise from 171 million in 2000 to 366 million in 2030 [1]. Epidemiological studies have shown that DM is more prevalent in the urban population which is on a rise in the developing countries. Projections are that, the urban population will double between 2000 to 2030 and there will be a proportionate increase in the number of diabetic patients, particularly those above 65 years [1].

Reports are suggestive that India will have the greatest absolute increase in the number of people with DM [1]. There are approximately 35 million people with DM in India, the largest number of diabetic patients in any given country. India is now considered the diabetic capital of the world. With its rising population, this is predicted to increase to 80 million by 2030 [1]. DR is a well-known complication of long standing and poorly controlled DM. It causes significant vision impairment and vision loss in the human population. DR is present in about 24% of diabetics [2]. Each year, approximately 12,000-24,000 diabetic patients develop visual impairment which is 12% of annual new cases of legal blindness [3].

DM causes a reduction in visual acuity, swelling of the lens and vision impairment, more so for the near vision. This is the reason diabetic patients change their near vision spectacles frequently. Retinopathy is known to cause loss of contrast sensitivity which is more severe with maculopathy [4,5]. Laser pan-retinal photocoagulation which is the gold standard of treatment for proliferative DR has been associated with visual field loss. Xenon arc poses a higher risk to visual field than argon or diode laser, as xenon produced full-thickness retinal burns [6]. It also depends on spot size, impact of laser power and fluence [7].

Several studies have demonstrated both a qualitative and a quantitative reduction in health related quality of life in persons with DR [3,8,9]. But no such study has been done in the Indian population. While studies have associated lower quality of life in those with DR, its impact on visual function is not clearly known [10]. With many new treatments now available for the management of DR, the impact of increasing severity of DR on visual function may help the clinician arrive at a decision on when to start treatment and also in monitoring treatment response. It will also aid the general physician to assess the patient in order to refer to the ophthalmologist earlier.

Various studies in the past have documented the development and psychometric characteristics of the VFQ-25 [11,12]. It has been shown to be superior to visual acuity in measuring the vision related quality of life since it takes into account of mental and social impact in addition to vision related activities [13]. The VFQ-25 was developed for use as an appropriate tool to measure quality of life across a range of visual disorders and the effect of treatment. This is an advantage over other measures such as the VF-14 which is more specific and was developed to assess outcomes associated with cataracts and associated treatments [14]. The VFQ-25 has been used in a wide range of different indications in ophthalmology [15]. The Los Angeles Latino Eye Study is one prominent example where the impact of vision loss on health related quality of life was assessed in a population cohort. The study assessed glaucoma,

retinopathy and age-related macular degeneration [16]. This work revealed the domains of the VFQ-25, such as vision related mental health, which were most sensitive to loss of vision. Mazhar K et al., [17] presented data that focused on the changes in quality of life experienced by people with DR.

MATERIALS AND METHODS

The study was conducted in the outpatient section of the Department of Ophthalmology at Father Muller Medical College Hospital and Father Muller Research Centre, Mangalore, Karnataka, India, from January 2012 to December 2012. All study procedures adhered to the principles outlined in the Declaration of Helsinki of 1975 that was revised in 2000 for research involving human subjects and clearance was obtained from the Institution Ethics Committee. Informed consent was obtained from all willing participants.

The inclusion criteria consisted of patients ≥ 18 years of age with Type 1 and Type 2 DM. The exclusion criteria were patients with any significant grade of cataract who were graded based on Oxford clinical cataract classification and grading system (central cortical cataract, central posterior subcapsular cataract or GR I nuclear sclerosis or more) and people with any mental illness. Patients with ocular ischemic syndrome, central retinal artery occlusion, central retinal vein occlusion and optic neuritis were also excluded from the study.

Random blood glucose and glycosylated haemoglobin were measured for purposes of identifying diabetes. A participant was considered to have DM if any of the following criteria were met:

(i) Had a history of diabetes and was being treated with oral hypoglycaemic medications, insulin, or diet alone;

(ii) Had a fasting glucose level of ≥ 126 mg/ dl;

(iii) HbA1c measured at 6.5% or higher;

(iv) Had a random blood glucose of 200 mg/100 ml or higher with clinical symptoms of diabetes;

(v) Had a 2h- plasma glucose level of ≥ 200 mg/dl after 75 g oral glucose tolerance test.

Subjects who were diagnosed with diabetes before the age of 30 years and were dependent on insulin were classified as having Type 1 DM. The rest were classified as Type 2 DM. The control group consisted of 26 subjects with DM who did not have any clinically detectable DR changes.

Data collection

The validated and translated interview versions of the NEI-VFQ-25 were administered to participants in this study. The NEI-VFQ-25 consists of questions related to general health and vision, difficulties with activities and response to vision problems. The questionnaires were completed face-to-face in an interview setting at the hospital by one of the investigators. The questionnaire was administered in a standardized manner in the participant's native language. It took approximately 10 minutes to complete. Standard scoring procedures were used [15-17].

Demographic information including age, sex, education, income, job status and insurance coverage were noted. Diabetic history included duration of diabetes, use of oral anti-diabetic drugs, insulin use, diet and lifestyle modification and use of alternative medicine. Presence of co-morbidities including hypertension, hyperlipidemia, cardiac disease and stroke and complications of diabetes including nephropathy, neuropathy and foot problems were also noted. Social history was taken including alcohol use, history of smoking, family support and caregiver status. History of prior screening for DR was taken from the patient. History of any prior laser treatment in the eye was also noted.

Ocular examination included measurement of patients Best Corrected Visual Acuity (BCVA), colour vision, slit lamp biomicroscopy, Intraocular Pressure (IOP) and dilated fundus examination. Measurement of visual function was obtained using BCVA using Snellens Chart at a distance of six metres where in the results were converted to Logarith of the Minimum Angle of Resolution (LogMAR) acuity for standardization. Colour vision was assessed using Ishihara's pseudoisochromatic chart (test plates 34). IOP was measured using air puff tonometer and dilated fundus examination was done with an indirect ophthalmoscope using a 20 D lens in all patients.

DR was defined as retinopathy consistent with diabetic disease in persons with definite diabetes mellitus. DR was assessed by masked standardized grading of stereoscopic photographs from seven standard fields. DR in each eye was graded using the final ETDRS classification as [18]:

(i) Mild non-proliferative;

(ii) Moderate non-proliferative;

(iii) Severe non-proliferative;

(iv) Very-severe non-proliferative;

(v) Proliferative diabetic retinopathy.

If the severity of retinopathy could not be graded in one of the eyes, the individual was considered to have a score equivalent to that in the other eye. In all patients with diabetic retinopathy fundus photograph was taken for counselling and future follow up.

Patients with Clinically Significant Macular Edema (CSME) as defined by the ETDRS guidelines included those with any retinal thickening within 500 microns of the centre of the macula, hard exudates within 500 micron of the centre of macula with adjacent thickening and retinal thickening at least one disc area of size, any part of which is within one disc diameter of the centre of the macula. These patients were made to undergo Spectral Domain-Optical Coherence Tomography (SD-OCT) in order to confirm the diagnosis.The mean of systolic and diastolic blood pressure were the averages of the last two measurements. Blood glucose, glycosylated haemoglobin (HbA1c), serum urea and serum creatinine values were obtained from venous blood sample.

STATISTICAL ANALYSIS

Analysis was carried out to compare visual related quality of life of patients with DR vs patients without DR using VFQ. Demographics including diabetes treatment, co-morbidities and presence of complications were compared between the two groups with Mann-Whitney test Z-value. Pearson correlation was done between the demographic data obtained and subscales of the VFQ using SPSS Statistics 23.0.

RESULTS

The present study consisted of 123 subjects. They were divided into 2 groups based on the presence of DR (97 in case group) and absence of DR (26 in control group). The details like demographics, co-morbidities, diabetic complications, ophthalmic appraisals, lifestyle modifications, medications and biochemical indices are included in [Table/Fig-1-5]. All 97 subjects with DR were diagnosed to have either non-proliferative or proliferative DR.

Of the 97 cases, 42.3% were females [Table/Fig-1]. Of the 26 controls, 53.8% were females. The mean±SD age in years of the cases was 55.09±9.56 and controls were 54.12±13.01 [Table/Fig-5]. The mean±SD of duration of diabetes in years for the cases was 10.98±5.62 and for controls was 6.69±2.29.

A lesser percentage of cases gave a history of smoking and alcohol consumption compared to controls. A larger proportion of the cases followed a diabetic diet and had modified their lifestyle compared to controls. Diabetic complications were higher among the cases. They also had a higher prevalence of hypertension and hypercholesterolemia [Table/Fig-2]. Among the cases, 9.4% had

prior laser treatment for DR, 11.5% underwent fundus fluorescein angiography and 8.3% underwent optical coherence tomography [Table/Fig-3].

Of the 97 patients in the cases group, 87 were on oral hypoglycaemics and 10 were on insulin therapy as shown in [Table/Fig-4]. Of the 26 patients in the control group, 21 were on oral hypoglycaemics and 2 were on insulin therapy. A 44.8% of cases and none among controls were on alternative medicine. The mean HbA1c level at the time of NEI-VFQ-25 among cases was 9.56% with a 95% confidence interval 8.00-11.11. The mean HbA1c among controls was 7.36% with a 95% confidence interval 6.78-7.95.

The distribution of the NEI-VFQ-25 scores is shown in [Table/Fig-6]. Among the cases, a considerate number of subscale scores were 100 and very few were 0. Among the sub-scales, driving had the lowest average, followed by general health. Ocular pain had the highest mean. The composite score had a mean of 73.93. Among the controls, majority of sub-scale scores were 100. The means of all the subscales were ≥95. There was a statistically significant lower VFQ-25 composite score of the cases when compared with controls. This was also found to be true for all the various sub-scales of VFQ-25 ($p<0.001$). Mann-Whitney test Z value was highest in general health, general vision, composite score and mental health.

VFQ- 25 subscales were correlated with grade of retinopathy, age, diabetes duration, blood glucose, glycosylated haemoglobin, systolic and diastolic blood pressure, serum urea and serum creatinine as shown in [Table/Fig-7]. As the grade of DR increased, VFQ-25 sub-scale scores decreased and this was statistically significant in the composite score and in all sub-scales ($p<0.005$) except ocular pain.

Age of the patient showed a negative correlation with VFQ-25 composite score. As the age increased, VFQ-25 sub-scale scores decreased and this was statistically significant in all sub-scales ($p<0.005$) except ocular pain. Duration of diabetes showed statistically significant correlation ($p<0.001$) with all sub-scales of

		Cases*	Controls
Religion	Hindu	49 (50.5)	9 (34.6)
	Muslim	15 (15.5)	6 (23.1)
	Christian	33 (34.0)	11 (42.3)
Sex	Male	56 (57.1)	12 (46.2)
	Female	41 (42.3)	14 (53.8)
Presently smoking	Yes	43 (46.2)	15 (57.7)
	No	50 (53.8)	11 (42.3)
Alcoholic	Yes	22 (24.7)	9 (36.0)
	No	67 (75.3)	16 (64.0)
Treatment cost	Insurance	15 (18.1)	20 (76.9)
	Self/ family	48 (57.8)	6 (23.1)
	NGO/ Religious trust	4 (4.8)	0 (0)
	Government schemes	16 (19.3)	0 (0)
Family	Joint	10 (12.7)	3 (12.0)
	Nuclear	69 (87.3)	22 (88.0)
Working	Yes	27 (55.1)	6 (54.5)
	No	22 (44.9)	5 (45.5)
Caregiver	Spouse	5 (5.4)	3 (11.5)
	Children	9 (9.8)	1 (3.8)
	Daughter/Son- in- law	33 (35.9)	15 (57.7)
	Siblings	45 (48.9)	7 (26.9)
Education	<7th standard	13 (14.4)	1 (3.8)
	7th- 10th standard	38 (42.2)	9 (34.6)
	10th- 12th standard	33 (36.7)	15 (57.7)
	Degree	6 (6.7)	1 (3.8)
Monthly income of patient/ family	< 25k	3 (3.6)	1 (3.8)
	26-35k	5 (6.0)	1 (3.8)
	36- 45k	16 (19.3)	2 (7.7)
	46k- 60k	22 (26.5)	8 (30.8)
	>60k	37 (44.6)	14 (53.8)

[Table/Fig-1]: Demographic details of the study groups.
* = Of the DR subjects, some volunteers did not answer some questions considered in [Table/Fig-1-4] and therefore do not add up to 97. Only the answered choices were considered for the analysis

		Cases*	Controls
Stroke	Yes	5 (5.3)	0 (0)
	No	90 (94.7)	26 (100.0)
Nephropathy	Yes	23 (24.2)	1 (3.8)
	No	72 (75.8)	25 (96.2)
Cardiac problems	Yes	6 (6.3)	0 (0)
	No	89 (93.7)	26 (100.0)
Neuropathy and foot problems	Yes	18 (18.9)	1 (3.8)
	No	77 (81.1)	25 (96.2)
Hypertension	Yes	65 (68.4)	17 (65.4)
	No	30 (31.6)	9 (34.6)
Hypercholesterolemia	Yes	34 (36.6)	3 (11.5)
	No	59 (63.4)	23 (88.5)

[Table/Fig-2]: Co morbidities and complications observed in the study groups.
* = Of the DR subjects, some volunteers did not answer some questions considered in [Table/Fig-1-4] and therefore do not add up to 97. Only the answered choices were considered for the analysis

		Cases*	Controls
Retinopathy- Right	No apparent retinopathy	2 (2.1)	26 (100.0)
	Mild NPR	26 (26.8)	0 (0)
	Moderate NPR	25 (25.8)	0 (0)
	Severe NPR	27 (27.8)	0 (0)
	Very severe NPR	8 (8.2)	0 (0)
	PDR	9 (9.3)	0 (0)
Retinopathy- Left	No apparent retinopathy	1 (1.0)	26 (100.0)
	Mild NPR	33 (34.0)	0 (0)
	Moderate NPR	35 (36.1)	0 (0)
	Severe NPR	16 (16.5)	0 (0)
	Very severe NPR	2 (2.1)	0 (0)
	PDR	10 (10.3)	0 (0)
History of screening for DR	Yes	40 (41.7)	12 (46.2)
	No	56 (58.3)	14 (53.8)
Fundus Fluorescein Angiography	Yes	11 (11.5)	0 (0)
	No	85 (88.5)	26 (100.0)
Optical Coherence Tomography	Yes	8 (8.3)	0 (0)
	No	88 (91.7)	26 (100.0)
Prior laser	Yes	9 (9.4)	0 (0)
	No	87 (90.6)	26 (100.0)
Colour vision	Present	77 (89.5)	26 (100.0)
	Absent	9 (10.5)	0 (0)
Knowledge of blurring of vision during hypoglycemia	Yes	37 (45.7)	11 (42.3)
	No	44 (54.3)	15 (57.7)
Diminution of vision	Painful	0 (0)	0 (0)
	Painless- Sudden	1 (1.1)	0 (0)
	Painless- Gradual	93 (98.9)	26 (100.0)
High risk PDR	Yes	6 (6.6)	0 (0)
	No	85 (93.4)	26 (100.0)
With clinically significant macular edema	Yes	36 (38.7)	0 (0)
	No	57 (61.3)	26 (100.0)

[Table/Fig-3]: Ophthalmic appraisals observed in the study groups.
* = Of the DR subjects, some volunteers did not answer some questions considered in [Table/Fig-1-4] and therefore do not add up to 97. Only the answered choices were considered for the analysis

		Cases		Controls
		NPDR*	PDR	
Oral hypoglycaemics	Yes	77(91.7)	10(100)	21 (84.0)
	No	7(8.3)	0(0)	4 (16.0)
Insulin Injection	Yes	10(13)	1(11.1)	2 (8.7)
	No	67(87)	8(88.9)	21 (91.3)
Herbal drugs/ homeopathy	Yes	17(44.7)	3(42.9)	0 (0)
	No	21(55.3)	4(57.1)	19 (100.0)
Diet modification	Yes	9(11.7)	1(12.5)	0 (0)
	No	68(88.3)	7(87.5)	24 (100.0)
Lifestyle modification	Yes	4(5.2)	0(0)	0 (0)
	No	73(94.8)	9(100)	24 (100.0)

[Table/Fig-4]: Life style modification and medications adhered to by the study groups.
* = Of the DR subjects, some volunteers did not answer some questions considered in [Table/Fig-1-4] and therefore do not add up to 97. Only the answered choices were considered for the analysis
NPDR – Non-proliferative retinopathy
PDR – Proliferative retinopathyconsidered for the analysis

		Mean±SD	95% CI of Mean	Mann- Whitney test Z value	p-value
Age	Cases Controls	55.09±9.56 54.12±13.02	53.12-57.06 48.86-59.37	0.05	0.964
Diabetes duration	Cases Controls	10.98±5.63 6.69±2.29	9.81-12.15 5.77-7.62	4.74	0.0001
Blood glucose	Cases Controls	204.62±40.04 206.38±56.98	196.28-212.95 183.37-229.40	0.60	0.548
HbA1c	Cases Controls	9.56±7.55 7.36±1.45	8.00-11.11 6.78-7.95	4.62	0.0001
Systolic BP	Cases Controls	136.72±9.50 131.60±8.51	134.75-138.68 128.09-135.11	2.40	0.016
Diastolic BP	Cases Controls	87.09±6.37 88.40±6.25	85.77-88.41 85.82-90.98	0.86	0.389
Urea	Cases Controls	50.30±28.94 45.24±17.53	43.90-56.69 38.00-52.48	0.23	0.820
Creatinine	Cases Controls	1.23±0.82 0.90±0.44	1.05-1.41 0.72-1.08	1.25	0.210

[Table/Fig-5]: Biochemical indices in the study groups.

		Mean ± SD	95% CI of Mean	Mann- Whitney test Z value	p-value
General health	Cases Controls	58.43±14.59 95.00±0.00	55.49- 61.37 95.00-95.00	7.92	0.0001
General vision	Cases Controls	63.69±19.26 97.88±2.52	59.80- 67.57 96.87- 98.90	7.86	0.0001
Ocular pain	Cases Controls	89.10±13.32 100.00±0.00	86.41- 91.78 100.0- 100.0	4.89	0.0001
Near activities	Cases Controls	70.79±30.56 98.24±2.10	64.63- 76.95 97.39- 99.04	5.73	0.0001
Distance activities	Cases Controls	72.68±32.41 98.40±2.07	66.15- 79.21 97.56- 99.23	3.42	0.001
Social functioning	Cases Controls	78.69±24.15 100.00±0.00	73.83- 83.56 100.0- 100.0	5.14	0.0001
Mental health	Cases Controls	71.71±28.77 98.27±2.43	65.92- 77.51 97.29- 99.25	6.12	0.0001
Role difficulties	Cases Controls	74.80±27.97 100.00±0.00	69.10- 80.50 100.0- 100.0	5.01	0.0001
Dependency	Cases Controls	77.17±27.93 100.00±0.00	71.48- 82.86 100.0- 100.0	4.74	0.0001
Driving	Cases Controls	48.84±42.63 100.00±0.00	27.64- 70.04 100.0- 100.0	5.27	0.0001
Colour vision	Cases Controls	76.29±28.27 100.00±0.00	70.66- 81.91 100.0- 100.0	4.18	0.0001
Peripheral vision	Cases Controls	69.58±32.92 99.04±4.90	63.04- 76.14 97.15- 100.92	4.08	0.0001
Composite score	Cases Controls	73.93±25.55 99.26±1.01	68.78- 79.08 98.85- 99.67	7.76	0.0001

[Table/Fig-6]: NEI-VFQ-25 scores in the study groups.

VFQ-25 except ocular pain and driving. Blood glucose levels were inversely proportional to all composite score and all subscales of VFQ-25 except ocular pain and driving (p<0.001). HbA1c showed no statistically significant correlation to any subscales of the VFQ-25. Systolic blood pressure showed a negative correlation (p<0.001) to composite score and all subscales of VFQ-25 except ocular pain and driving. But there was no significant correlation between diastolic blood pressure and any of the subscales of VFQ- 25. Grade of retinopathy was statistically related (p<0.001) to duration of diabetes. It was found to increase as the duration of diabetes increased. It was also related to age of the patient. No significant correlation was found between grade of retinopathy and HbA1c levels (p=0.149).

DISCUSSION

With improvement in healthcare facilities, the average life span of Indians is on the rise and so is the prevalence of diabetics. The long duration of diabetes puts them at significant risk of developing DR. DR is now a leading cause of blindness. As with all chronic diseases, patients with diabetic retinopathy suffer from physical and mental trauma. As health care advances and we are moving towards a more patient centered approach, it becomes important to evaluate the extent to which the disease has affected the patient's life.

For this study, we chose NEI-VFQ-25 because it takes into account many aspects of daily living to assess the physical and psychological implications of DR over vision related quality of life. In this study, we found that quality of life was significantly reduced in diabetics with DR when compared with those without DR. It was related to the duration of diabetes rather than glucose control by the patient. This was evident by the lack of correlation between the subscale scores of VFQ-25 and HbA1c. Besides, severity of DR showed positive correlation with duration of diabetes which has been inferred by previous studies [19]. General health was affected the most, followed by general vision and mental health. Thus just the presence of DR in diabetics affected the perception of their general health to a significant extent (p<0.0001). It is also important to note that mental health was affected significantly. The mental health subscale documents the worry, frustration, lack of control over activities and the fear of potential embarrassment associated with eyesight. Higher scores were obtained with regards to ocular pain, social functioning and colour vision similar to a study by Lloyd and his colleagues [20]. The results of the Wisconsin Epidemiologic Study of Diabetic Retinopathy also suggest the same [10]. Lowest scores were obtained in general health, general vision and driving. Similar results were documented in previous studies [20,21].

Quality of life was evidently related to the severity of retinopathy. Composite score and scores of all subscales of VFQ-25 except ocular pain decreased as the severity of retinopathy increased. Lowest scores were obtained from those with proliferative DR. The decrease in scores of subscales was almost uniform. All subscales of VFQ-25 except ocular pain were also related to each other as deduced from Pearson correlation done between them. Ocular pain is often only experienced in advanced/ end-stage DR such as in patients with neovascular glaucoma due to DR. This could explain the absence of correlation. Similar difficulty in driving, reading, work and social activities to an extent that it severely affected daily life was documented by Coyne KS and co workers [22]. A study on the effect of DR and its severity on health related quality of life (HR-QOL) in a population based sample of Latinos with Type 2 DM also used VFQ-25 and obtained similar results [17].

Influence of co-morbidities which also affect lifestyle of the patient like neuropathy and nephropathy could not be eliminated since they are all microvascular complications of diabetes and tend to occur together.

	Grade of retinopathy - Right	Grade of retinopathy - Left	Age	Diabetes duration	Blood glucose	HbA1c	Systolic BP	Diastolic BP	Serum Urea	Serum Creatinine
General health	-0.87 (*)	-0.83 (*)	-0.39 (*)	-0.75 (*)	-0.39 (*)	-0.14	-0.35 (*)	-0.22 (†)	-0.22 (†)	-0.35 (*)
General vision	-0.87 (*)	-0.81 (*)	-0.36 (*)	-0.71 (*)	-0.35 (*)	-0.09	-0.38 (*)	-0.23 (†)	-0.24 (†)	-0.37 (*)
Ocular pain	-0.26 (*)	-0.16	-0.11	-0.04	-0.22 (†)	-0.07	-0.05	-0.09	0	-0.15
Near activities	-0.83 (*)	-0.73 (*)	-0.37 (*)	-0.68 (*)	-0.36 (*)	-0.09	-0.39 (*)	-0.24 (†)	-0.27 (†)	-0.42 (*)
Distance activities	-0.85 (*)	-0.77 (*)	-0.37 (*)	-0.71 (*)	-0.37 (*)	-0.09	-0.45 (*)	-0.27 (*)	-0.26 (†)	-0.42 (*)
Social functioning	-0.76 (*)	-0.69 (*)	-0.46 (*)	-0.63 (*)	-0.36 (*)	-0.07	-0.44 (*)	-0.28 (*)	-0.23 (†)	-0.39 (*)
Mental health	-0.84 (*)	-0.76 (*)	-0.35 (*)	-0.70 (*)	-0.39 (*)	-0.09	-0.45 (*)	-0.28 (*)	-0.26 (†)	-0.40 (*)
Role difficulties	-0.82 (*)	-0.73 (*)	-0.30 (*)	-0.69 (*)	-0.37 (*)	-0.05	-0.45 (*)	-0.25 (†)	-0.30 (*)	-0.44 (*)
Dependency	-0.82 (*)	-0.73 (*)	-0.38 (*)	-0.67 (*)	-0.35 (*)	-0.07	-0.49 (*)	-0.26 (†)	-0.28 (†)	-0.43 (*)
Driving	-0.66 (*)	-0.72 (*)	-0.42	-0.59 (†)	-0.43	-0.47 (†)	0.18	-0.10	-0.07	-0.42
Colour vision	-0.83 (*)	-0.72 (*)	-0.39 (*)	-0.68 (*)	-0.36 (*)	-0.08	-0.51 (*)	-0.33 (*)	-0.26 (†)	-0.39 (*)
Peripheral vision	-0.86 (*)	-0.76 (*)	-0.34 (*)	-0.74 (*)	-0.35 (*)	-0.07	-0.50 (*)	-0.29 (*)	-0.29 (*)	-0.39 (*)
Composite score	-0.85 (*)	-0.76 (*)	-0.38 (*)	-0.70 (*)	-0.38 (*)	-0.09	-0.45 (*)	-0.27 (*)	-0.26 (†)	-0.41 (*)

[Table/Fig-7]: Association of various subscales and total VFQ-25 scores with the retinopathy grade and clinical and biochemical endpoints.
* Correlation is significant at the 0.01 level (2-tailed).
† Correlation is significant at the 0.05 level (2-tailed).

LIMITATION

Potential limitations of this study include a systematic bias of non-consenting patients. The change in progression of vision was not recorded due to absence of follow-up data. It is also important to note that the subscale driving may not have been accurately assessed due to fewer responses in that section as most of the participants use public transport or are no longer driving.

CONCLUSION

In summary, quality of life was significantly lower in diabetics with DR when compared with those without DR with maximum effect seen on general health, general vision and mental health. Quality of life decreased as the duration of diabetes and severity of retinopathy increased.

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PARTICULARS OF CONTRIBUTORS:
1. Research Assistant, Father Muller Research Centre, Mangalore, Karnataka, India.
2. Assistant Professor, Department of Ophthalmology, Father Muller Medical College, Mangalore, Karnataka, India.
3. Senior Resident, Department of Ophthalmology, Father Muller Medical College, Mangalore, Karnataka, India.
4. Research Assistant, Father Muller Research Centre, Mangalore, Karnataka, India.
5. Student, Father Muller Research Centre, Mangalore, Karnataka, India.
6. Assistant Professor, Department of Ophthalmology, K.S. Hegde Medical Academy, Mangalore, Karnataka, India.
7. Assistant Professor, Department of Community Medicine, Father Muller Medical College, Mangalore, Karnataka, India.
8. Head, Father Muller Research Centre, Mangalore, Karnataka, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Manjeshwar Shrinath Baliga,
Father Muller Research Centre, Kankanady, Mangalore-575002, Karnataka, India.
E-mail: msbaliga@gmail.com

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