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Original Research Article

Impact of severity of diabetic retinopathy on quality of life in type 2 Indian diabetic patients

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ABSTRACT

Background: Diabetes mellitus is a global public health challenge of 21st century and diabetic retinopathy is a common complication of long standing and poorly controlled diabetes which hampers patient's physical, social and emotional well-being leading to poor quality of life. Objective was to study the correlation between severity of diabetic retinopathy and quality of life in type II DM patients.
Methods: A prospective, longitudinal and observational study was conducted in 120 patients of type II diabetes with diabetic retinopathy in a tertiary eye care centre of North India over a period from Feb. 2019 to March 2020. After doing initial ocular and systemic examination, each patient was interviewed in their local language as per NEI-VFQ-25 questionnaire. The response was calibrated quantitatively and total QoL score was calculated.
Results: Out of 120 patients of diabetic retinopathy, QoL Score was 69.8-88.8 in mild NPDR, 53.2-72.4 in moderate, 37.8-58.4 in severe NPDR and 22.4-42.2 in PDR with statistically significant difference ($p<0.001$). Median QoL Score was highest in mild NPDR patients and lowest in PDR, which signifies that quality of life deteriorates with severity of DR.
Conclusions: Diabetic retinopathy has an adverse effect on the QoL, which increases with severity of DR.

Keywords: Diabetic retinopathy, Diabetes mellitus, Quality of life

INTRODUCTION

Diabetes mellitus (DM) is one of the most important emerging public health challenges of 21st century and burden is increasing because of population growth, high life expectancy, urbanization and sedentary life style. The situation is more alarming in developing countries as three-fourth of worldwide diabetes affected population is from developing countries only. India has an estimated 77 million people with DM, which makes it the second most affected country in the world after China.[1]

Diabetic retinopathy (DR) is a well-known complication of long standing and poorly controlled diabetes mellitus which hampers patient's physical, social and emotional well-being leading to poor quality of life. It is a microangiopathy affecting retinal precapillary arterioles, capillaries and venules.[2] Nearly all patients with type 1 diabetes and >60% of patients with type 2 diabetes are expected to have some form of retinopathy by the first decade of incidence of diabetes.[3] Diabetic macular edema (DME) and vitreous haemorrhage are leading cause of legal blindness in diabetic patients. Even in cases where retinopathy has not yet progressed to blindness, loss in VA is a major problem and may lead to significant reduction in functional status. DR is the third leading cause of severe visual impairment among inner-city adults ≥40 years of age.[4]

Visual impairment due to diabetic retinopathy and the cost associated with its treatment hugely affect life of patients adversely.[5] Visual acuity and visual field

assessment are used in ophthalmology to assess vision but these are not sufficient to assess actual problems faced by the patients. Hence it become important to know the patient's feelings about diabetic retinopathy in terms of quality of life. The World Health Organization defines the quality of life (QoL) as 'individual's perception of their positions in life in the context of culture and value systems in which they live and in relation to their goals, expectations, standards and concerns.[6]

There are various methods developed for measuring the effect of diabetic retinopathy on QoL. One of the widely used technique is a questionnaire developed by American National Eye Institute is National Eye Institute Visual Functioning Questionnaire 51 (NEI-VFQ 51). NEI-VFQ-51 is a long questionnaire but for research purposes a shorter version is required hence NEI-VFQ 25 version 2000 was developed.[7] On average, each VFQ-25 sub scale predicts 92% of the variance in the corresponding 51-item sub scale score.[8] The survey measures the influence of visual disability and visual symptoms on generic health domains such as emotional well-being and social functioning, in addition to task-oriented domains related to daily visual functioning.[9] NEI-VFQ 25 is more useful in assessing quality of life in diabetics than visual acuity alone since it takes into account the mental and social impact in addition to vision related activities.[8] To the best of our knowledge, no study has been conducted in North India using National Eye Institute VFQ-25 questionnaire to assess the correlation of quality of life with severity of diabetic retinopathy.

Hence, the present study was conducted to evaluate QoL in patients of diabetic retinopathy and find its correlation with severity of DR, HbA1c, education level, socioeconomic status, occupation and duration of disease.

METHODS

A prospective, hospital based observational study was conducted in 120 type II diabetes patients with diabetic retinopathy in a tertiary eye care centre of North India over a period from Feb. 2019 to March 2020 after taking ethical clearance from the Institutional Ethics Committee.

Inclusion criteria

Type 2 diabetes mellitus patients of age >40 years of any gender with diabetic retinopathy.

Exclusion criteria

Patients not willing to participate in the study; active infection; co-existing ocular disorders like uveitis, glaucoma and cataract; patients undergoing concomitant procedures for other ophthalmological conditions; patients with other systemic illness which can affect their quality of life significantly; patients with cognitive impairment to avoid communication gap.

A detailed history of the onset and duration of the symptoms was taken. Each patient's complete systemic medical history and ocular history including history of trauma, inflammation, any intraocular surgery and intravitreal drug therapy in the past was enquired. Thorough ocular examination was done in each patient including slit lamp examination, indirect ophthalmoscopy and slit lamp bio microscopy with 90 D/78 D. Diabetic retinopathy was graded according to ETDRS classification. Necessary lab investigations were done as per proforma.

After doing initial ocular examinations and systemic examination, each patient was interviewed as per questionnaire (NEI-VFQ-25) version 2000 with slight modifications suited to the study population. The questionnaire was translated to patients in their local language to avoid any miscommunication. The response was calibrated quantitatively by giving a score to each response. Visual function was graded from excellent to poor according to the score. The summary score from each domain was added to give a total QoL. The data was collected using piloted proforma meeting the objectives of the study.

At the end of study, the data was tabulated using Microsoft Excel database and subsequently exported to statistical software for analysis. Statistical analysis was performed using SPSS for Windows software (version 21.0, SPSS Inc., Chicago, USA). Statistical tests used were Chi square test, Independent t test and Analysis of variance (ANOVA). Continuous variables in the study were reported as mean±standard deviation. The Shapiro-Wilk test was carried out for continuous variables for checking normality of distribution. The results were considered statistically significant at $p \leq 0.05$.

RESULTS

A total of 120 cases of diabetic retinopathy were enrolled in the study after taking informed consent over a period of 1 year. In our study group, 60% were males and 40% were females with M:F ratio of 3:2 with mean age of patients being 55.52±14.07 years (Table 1).

Table 1: Gender distribution.

Gender	Frequency	Percentage
Male	72	60.0
Female	48	40.0
Total	120	100.0

In this study, 9 were illiterate, 22 were primary educated, 5 were having middle education, 28 were educated up to high school, 18 were intermediate, 13 were graduates and 25 were postgraduates (Figure 1). In this study, 67.5% of the participants were above the poverty line and only 32.5% were below the poverty line.

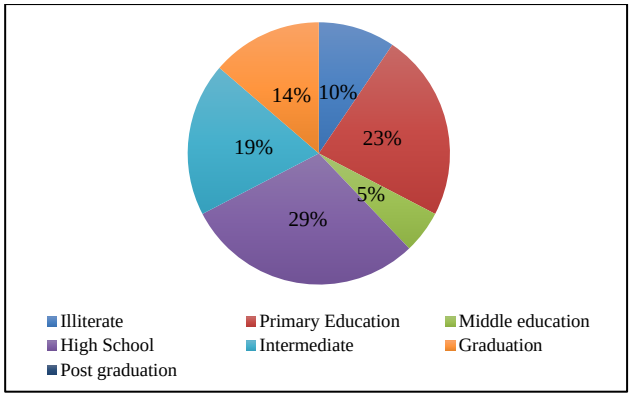

Figure 1: Education profile.

The mean duration of diabetes mellitus was found to be 7.78±4.62 years in this study. 39.2% cases had BCVA of >6/18, 53.3% cases had BCVA of <6/18 to 3/60 and 7.5% of the participants had BCVA of <3/60 in right eye. 45.8% of participants had BCVA of >6/18, 44.2% cases had BCVA of <6/18 to 3/60 and 10.0% patients had BCVA of <3/60 in left eye.

Table 2: Distribution of HbA1c.

HbA1c	Frequency	Percentage
5.7-6.4%	10	8.3
≥6.5%	110	91.7
Total	120	100.0

Out of 120 participants, only 18.3% cases had FBS <100 mg/dl, 38.3% cases had FBS between 100-125 mg/dl and 43.3% of the participants had FBS>126 mg/dl which signifies that maximum number of patients were having FBS≥126 mg/dl i.e. raised fasting blood glucose level. Only 8.3% patients had HbA1c of 5.7-6.4% which depicts a good glycemic control over past 3 months while 91.7% patients had HbA1c≥6.5% which depicts poor glycemic control over past 3 months showing majority of diabetic patients have poor glycemic control.

Out of 120 patients in our study, 20.0% participants had mild NPDR, 49.2% of the participants had moderate NPDR, 19.2% had severe NPDR and only 11.7% of the participants had PDR as per ETDRS classification.

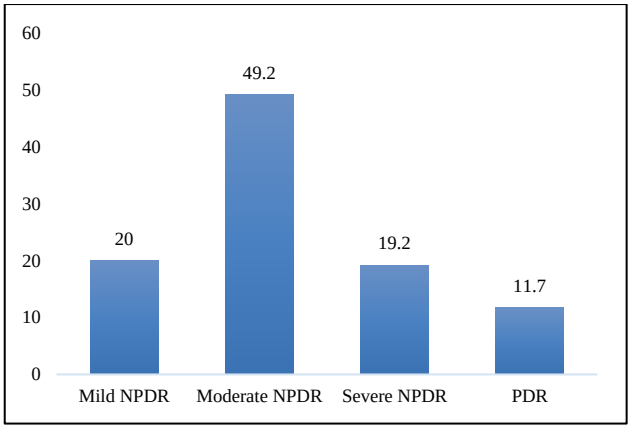

Figure 2: Distribution of diabetic retinopathy.

Out of 106 patients of NPDR, only 21.7% of the participants had no DME while majority of participants i.e. 78.3% had DME at the time of presentation. The mean (SD) of QoL score was 45.47 (22.84) in the illiterate group, 54.47 (13.95) in primary group, 59.82 (6.49) in the middle education group, 62.57 (15.91) in the high School group, 61.72 (13.08) in the intermediate group, 63.25 (12.26) in graduates and 65.32 (9.97) in post graduates which signifies that QoL improves with education profile because of better awareness and compliance (Table 3).

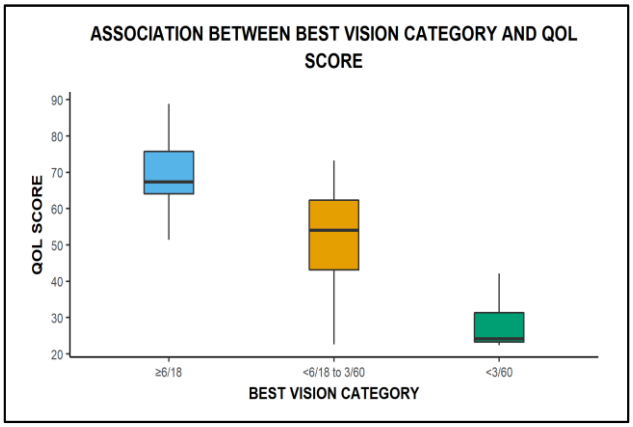

Figure 3: Correlation between BCVA and QOL score.

Table 3: Correlation between education status and QoL score.

QOL score	Education							Kruskal Wallis test	
	Illiterate	Primary	Middle	High school	Intermediate	Graduate	Postgraduate	χ^2	P value
Mean (SD)	45.47 (22.84)	54.47 (13.95)	59.82 (6.49)	62.57 (15.91)	61.72 (13.08)	63.25 (12.26)	65.32 (9.97)	14.011	0.030
Median (IQR)	42.1 (37.2)	61.1 (20.37)	60.6 (10.5)	66.4 (15.12)	64.35 (15.4)	63.2 (18.4)	66.4 (8)		
Range	22.8-82.2	22.6-78.8	52.2-67.2	22.4-88.8	29.4-78.3	37.6-78.6	34.1-79.6		

The mean QOL score in >6/18 BCVA group was 69.19, in <6/18 to 3/60 group was 52.69 and in <3/60 group was 28.31 in our study which signifies that quality of life is better in patients with better visual acuity (Figure 3).

The mean QoL score in the patients with DME was 60.45 and in patients without DME was 77.52. The mean (SD) of QoL score was 77.50 (4.48) in Mild NPDR group, 64.43 (3.57) in moderate NPDR, 49.51 (5.97) in severe NPDR and 30.31 (7.04) in PDR group.

Table 4: DME and QoL score correlation.

QOL score	DME		Mann-Whitney U test	
	Present	Absent	U	P value
Mean (SD)	60.45 (8.18)	77.52 (4.61)	14.000	<0.001
Median (IQR)	62.8 (11.95)	78.2 (5.05)		
Range	37.8-75.8	70.4-88.8		

The mean (SD) of QoL score was 77.50 (4.48) in mild NPDR group, 64.43 (3.57) in moderate NPDR, 49.51 (5.97) in severe NPDR and 30.31 (7.04) in PDR group. It depicts that with the increasing severity of diabetic retinopathy, QoL deteriorates significantly (p<0.001).

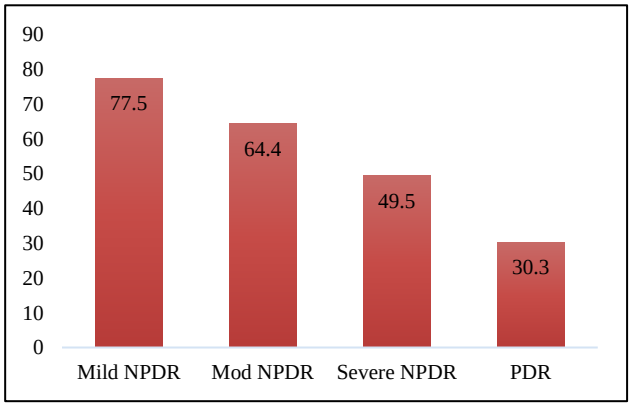

Figure 4: Correlation between severity of DR and QoL.

DISCUSSION

The mean age (years) was found to be 55.52±14.07 years in this study which was similar with study conducted by Fenwick et al.[10] Out of 120 patients, 72 (60.0%) of the participants were males and 48 (40.0%) were females with a M:F ratio of 3:2. Similar results were concluded by Glen et al and Niveditha et al in their studies.[11,12]

The mean duration of DM (years) was found to be 7.78±4.62 years in our study. These results were compatible with studies done by Klein et al and Pereira et al.[5,13] The mean QoL score was found to be 45.47 in illiterate group, 54.47 in primary group, 59.82 in middle group, 62.57 in high school group, 61.72 in intermediate group, 63.25 in graduates and 65.32 in postgraduates. It signifies that QoL improves with educational status and these results matched with studies done by Chaturvedi et al and Larsson et al.[14,15]

In the present study, the mean QoL score in ≥6/18 BCVA group was 69.19, <6/18 to 3/60 group was 52.69 and <3/60 group was 28.31. There was a positive correlation between visual acuity and QoL. Similar results were shown by Hanninen et al and Mac Clure et al in their study.[9,16]

The mean HbA1c (%) in our study group was found to be 8.56±1.79. We found only 10 (8.3%) participants were having 5.7-6.4% HbA1c while 110 (91.7%) participants were having ≥6.5% HbA1c signifying poor glycemic control in majority of diabetic patients in our study. Same results were concluded by Niveditha et al and Larsson et al.[12,15]

In our study out of 106 patients of NPDR, 78.3% of the participants had DME and only 21.7% of the participants had no macular edema. The mean QoL score in the patients with DME was 60.45 and in patients without DME was 77.52. We found poor quality of life in patients with macular edema due to impaired vision. Our results were compatible with studies done by Klein et al and Fenwick et al.[5,10]

In our study the mean (SD) of QoL score was 77.50 (4.48) in mild NPDR group, 64.43 (3.57) in mode rate NPDR, 49.51 (5.97) in severe NPDR and 30.31 (7.04) in PDR group. The mean QoL score was highest in the mild NPDR group and lowest in the PDR group. Similar results were concluded by Pereira et al, Alcubierre et al and Fenwick et al in their study.[10,13,17]

We have to acknowledge that this study has some limitations too. In particular, quality of life in diabetics with DR was not compared with those without DR. Type 1 DM patients were also not included in our study and effect of various treatment modalities i.e. intravitreal anti VEGF injection, intravitreal steroid injection and lasers on quality of life in DR patients was also not discussed. Number of subjects in this study was small since it was a thesis project. Hence the results obtained and conclusion drawn cannot be generalized till a study is done in which sufficiently large number of subjects are studied.

CONCLUSION

In our study, there was a strong negative correlation between severity of diabetic retinopathy and QoL score. Hence, we concluded that DM not only affect patients physically but hampers their quality of life too in an adverse way. Quality of life decreases as the duration of DM and severity of DR increases. Patients with DR experience many socioemotional issues in addition to vision related activity limitations. So only treatment of DM and DR should not be our aim, but we should opt a

more holistic approach to improve quality of life of patient.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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