Prevalence of diabetic retinopathy in patients reporting to a tertiary care diabetic center of western Uttar Pradesh

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Abstract

Purpose: To measure the prevalence of diabetic retinopathy in patients reporting to a tertiary care diabetic and endocrinology center, in western Uttar Pradesh.

Materials and Methods: A hospital-based, cross-sectional study conducted on 240 eyes of 120 diabetic patients. The fundus photographs using visucam 500 were taken and classified using the abbreviated ETDRS grading system for the severity of retinopathy. The data was analysed using SPSS version 16.0 version (Chicago, Inc., USA). The Chi-square test was used to compare categorical variables. The binary logistic regression analysis was carried out to find the strength of association between prevalence of DR with various factors. The odds ratio (OR) with its 95 per cent confidence interval was calculated.

Result: The overall prevalence of DR was found to be 52.5% (63 patients), out of 120 diabetic patients who were included in the study. Out of which nine (14.3%) had a unilateral involvement and 54 (85.7%) had a bilateral involvement.

Conclusion: The overall prevalence of DR was found to be 52.5% among the patients reporting to a tertiary care diabetes and endocrinology center, in western Uttar Pradesh. Out of the affected patients, 14.3% patients had a unilateral involvement and 85.7% patients had a bilateral involvement. Mild NPDR was observed to be the most common stage. Severe NPDR, high risk PDR and ADED were found to be uncommon. This signifies a good control of the disease, minimizing the occurrence of severe grades of diabetic retinopathy, which are mainly responsible for vision loss.

Keywords: Diabetic retinopathy, ETDRS grading, Prevalence.

Introduction

Diabetes mellitus is reaching potentially epidemic proportions in India. The level of morbidity and mortality due to diabetes and its potential complications are enormous, and pose significant healthcare burdens on both, families and society. In India, the steady migration of people from rural to urban areas, the economic boom, and corresponding change in life-style are all affecting the level of diabetes.

Newly diagnosed diabetic cases are increasing at an alarming rate in the developing countries like India due to better life style and the demographic right shift of the population, urbanization and disparities in the access to the health care system. Approximately, 382 million people across the world have been estimated to have DM in 2013 and if no action is taken this number will rise to 592 million by 2035.[1] WHO estimates that 19% of the world's diabetic population lives in India and 80 million people in India will have diabetes by the year 2030.[2]

Given the magnitude of the disease across all sections of the society within India, there is now a demand for urgent research and intervention, at regional and national levels in order to mitigate the potentially catastrophic increase in diabetes that is predicted for the upcoming years.

Materials and Methods

Ours was a hospital based, cross-sectional study, conducted on 240 eyes of 120 patients presenting to the 'Retina Clinic' of the Institute of Ophthalmology, Aligarh Muslim University, Aligarh from January 2016 to October 2017, after being referred from Rajiv Gandhi Center for Diabetes and Endocrinology, of the same hospital. All the patients were examined by a single examiner and the information was collected on a predesigned pro forma.

Inclusion Criteria: All diagnosed cases of diabetes mellitus with age greater than 20 years, and having a reasonably clear media.

Exclusion Criteria:
1. The patients with media not clear.
2. The patients with gestational diabetes mellitus.
3. The patients where fundus photography was not possible (in any particular eye or field) due to inadequate dilatation or an inability to co-operate, properly.

This cross-sectional study was conducted after getting an approval from the Ethical Committee, Jawaharlal Nehru Medical College and Hospital, A.M.U., Aligarh, and was according to the Declaration of Helsinki. An informed written consent was taken from each patient before their participation in the study. A clinical history was taken with the help of a structured questionnaire including- demographic data, duration of diabetes, treatment taken, addiction, dietary habits, family history of diabetes, and blood pressure.

A thorough clinical examination was done to grade

the severity of diabetic retinopathy appropriately with the help of dilated fundus examination using Slit Lamp Biomicroscopy, Direct Ophthalmoscopy, Indirect Ophthalmoscopy, Fundus Fluorescein Angiography and OCT. A fundus photograph using Visucam 500 was taken and the modified Airlie House classification (also known as the abbreviated ETDRS classification) of diabetic retinopathy was used to grade the severity of diabetic retinopathy in patients, who reported at our center.

Technique for Grading of Diabetic Retinopathy: The modified Airlie House classification of diabetic retinopathy used in the Diabetic Retinopathy Study (DRS) was extended for use in the Early Treatment Diabetic Retinopathy Study (ETDRS). And the same classification was also used in the present study. The non-simultaneous stereoscopic pairs of the seven standard fields are taken with Visucam 500 camera. The sets of photographs from the two eyes of each patient, are graded independently, and the results are entered on a form. Each abnormality is graded separately, some of them in a single field and some in each of 5 to 7 fields. Information obtained from overlapping parts of adjoining fields is used whenever it is helpful to determine the nature or severity of an abnormality within the field being graded.

The data was analysed using Statistical package for Social Sciences (SPSS) 16.0 version (Chicago, Inc., USA). The results are presented in frequencies, percentages and mean ± SD. The Chi-square test was used to compare categorical variables. The binary logistic regression analysis was carried out to find the strength of association between prevalence of DR with various factors. The odds ratio (OR) with its 95% confidence interval was calculated.
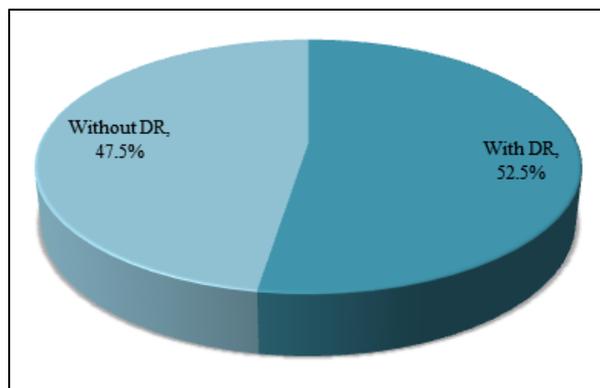
Observation and Results

Table 1: Distribution of overall (either right or left eye) prevalence of Diabetic retinopathy (DR)

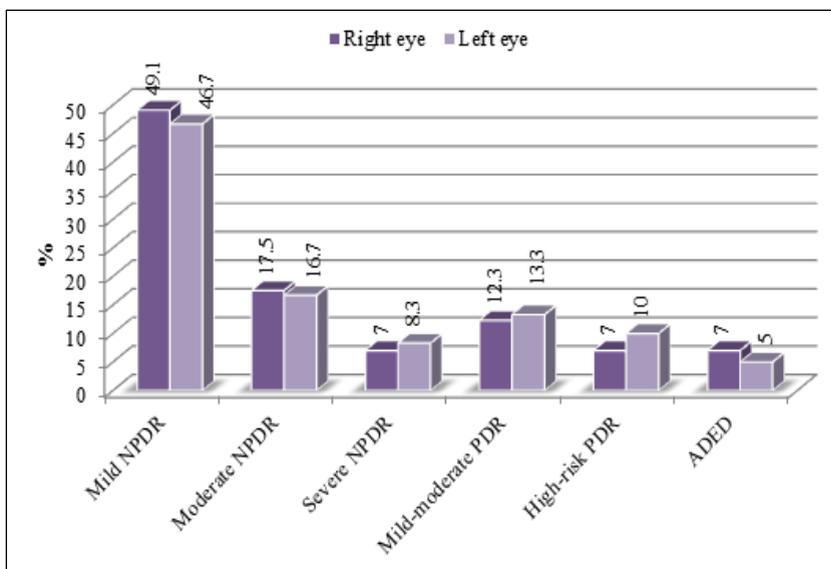| Prevalence	No. (n=120)	%
With DR	63	52.5
Without DR	57	47.5

Fig. 1: Distribution of overall prevalence of Diabetic retinopathy (DR)

The overall prevalence of DR was found to be 52.5%, out of 120 diabetic patients who were included in the study. (Table-1, Fig.1)

Table 2: Distribution of the affected eyes among the DR patients

Affected Eyes	No. (n=63)	%
Left	6	9.5
Right	3	4.8
Both	54	85.7

Out of the nine (14.3%) patients who had a unilateral presentation, six (9.5%) had a left eye involvement and the remaining three (4.8%) had a right eye involvement (Table 2).

Table 3: Distribution of Stage of Diabetic retinopathy (DR)

Stage	Right eye (n=57)		Left eye (n=60)	
	No.	%	No.	%
Mild NPDR	28	49.1	28	46.7
Moderate NPDR	10	17.5	10	16.7
Severe NPDR	4	7.0	5	8.3
Mild-moderate PDR	7	12.3	8	13.3
High-risk PDR	4	7.0	6	10.0
ADED	4	7.0	3	5.0

Fig. 2: Distribution of Stage of Diabetic retinopathy (DR)

Mild NPDR was the most common stage in both, right (49.1%) and left eye groups (46.7%). Severe NPDR, high risk PDR and ADED were uncommon in the right eye group (7.0%). Similarly, ADED was the least common in left eye group (5.0%).This signifies a good control of the disease, minimizing the occurrence of severe grades of diabetic retinopathy, which is mainly responsible for vision loss. (Table 3, Fig. 2)

Furthermore, the prevalence of DR was higher among rural patients (70.6%) compared to urban (39.1%). The prevalence of DR was 3.73 times significantly higher among rural than urban patients (OR=3.73, 95% CI=1.72-8.08, p=0.001).

Table 4: Association of prevalence of Diabetic retinopathy (DR) with age

Age in years	No. of patients	With DR		Without DR		OR (95%CI)	p-value[1]
		No.	%	No.	%		
<40	25	9	36.0	16	64.0	0.56 (0.17-1.86)	0.34
40-50	34	19	55.9	15	44.1	1.26 (0.41-3.83)	0.67
51-60	41	25	61.0	16	39.0	1.56 (0.53-4.59)	0.41
>60	20	10	50.0	10	50.0	1.00 (Ref.)	

OR-odds ratio, CI-Confidence interval, [1]Binary logistic regression
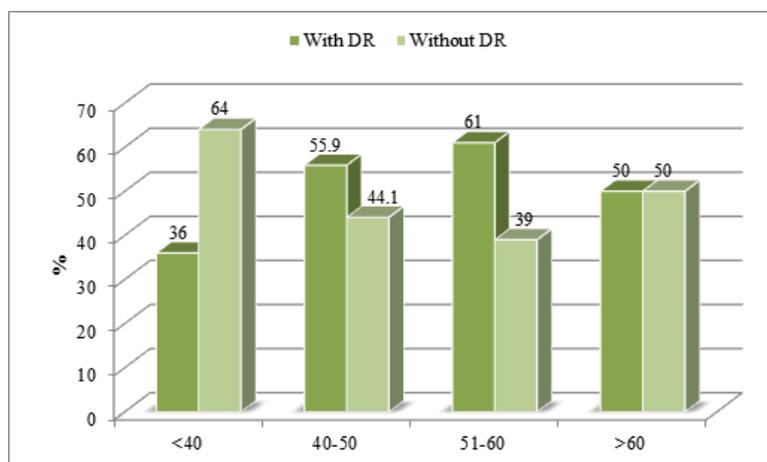
Fig. 3: Association of prevalence of Diabetic retinopathy (DR) with age

The prevalence of DR was higher in age 51-60 years (61%) than 40-50 (55.9%), >60 (50%) and <40 (36%) years. (Table 4, Fig. 3)

Table 5: Association of prevalence of Diabetic retinopathy (DR) with gender

Gender	No. of patients	With DR		Without DR		OR (95%CI)	p-value[1]
		No.	%	No.	%		
Female	61	29	47.5	32	52.5	0.66 (0.32-1.37)	0.26
Male	59	34	57.6	25	42.4	1.00 (Ref.)	

OR-odds ratio, CI-Confidence interval, [1]Binary logistic regression
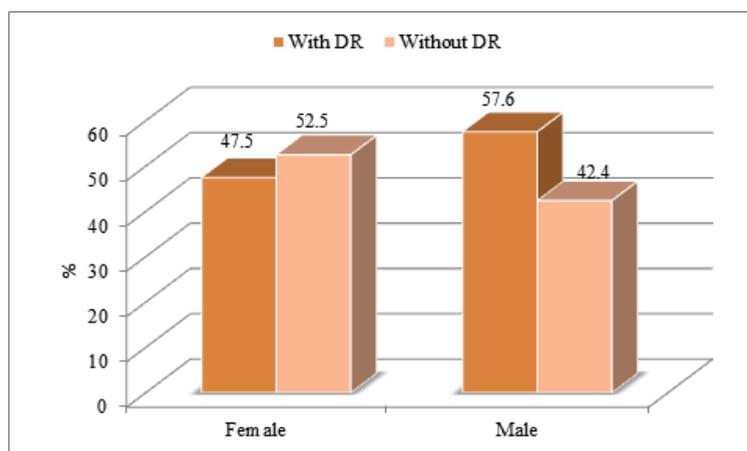
Fig. 4: Association of prevalence of Diabetic retinopathy (DR) with gender

The prevalence of DR was higher among males (57.6%) than females (47.5%). (Table 5, Fig.4)

Discussion

Diabetes is growing alarmingly in India, home to more than 65.1 million people with the disease, which is the largest in the world.[3] This makes us the diabetic capital of the world.[4] It is predicted that by 2030 DM may afflict up to 79.4 million individuals in India, while China (42.3 million) and the United States (30.3 million) will also see significant increases in those affected by the disease.[3]

Along with the rise in Diabetes prevalence, there is also an alarming rise in the prevalence of Diabetic retinopathy (DR) in both urban and rural India. Epidemiological data from India suggests the prevalence of DR is 18% in the urban and 10.4% in the rural India.[5] It means DR is found in every fifth person with diabetes in the urban and in every tenth person with diabetes in the rural areas of India.

In our study, the overall prevalence of DR was found to be 52.5% (63 patients), out of 120 diabetic patients who were included in the study. Out of which, nine (14.3%) had a unilateral involvement and 54 (85.7%) had a bilateral involvement. And among the nine (14.3%) patients, who had a unilateral presentation, six (9.5%) had a left eye involvement and the remaining three (4.8%) had a right eye involvement. A selection bias incurred as a result of the hospital-based study, has led to a relatively high observed prevalence of diabetic retinopathy, in the study group.

Such a high prevalence of diabetic retinopathy could be attributed to the tertiary care nature of the hospital under study. The fact that the tertiary care Diabetic Center caters to a huge amount of only diabetic patients, the importance of the study could be realized by the interdisciplinary approach adopted to reach out a large number of high risk diabetic patients requiring timely intervention for the eye disease, if any, thereby, reducing the burden of irreversible blindness incurred as a consequence of diabetic retinopathy.

According to the UK National diabetic retinopathy screening service, the prevalence of any DR in those with Type 1 diabetes was 56.0%, and in Type 2 diabetes was 30.3%.[6]

Our study demonstrated a poor metabolic control in rural diabetics, perhaps, owing to the low socio-economic status and infrequent follow up visits to diabetes center leading to a prevalence of DR which was 3.73 times significantly higher among rural patients (70.6%) compared to the urban diabetic patients (39.1%). The tertiary health care center being easily approachable to the urban patients was one of the many confounding factors, leading to a better diabetic control and decreased prevalence of DR among them. Moreover, the overall population reporting to a tertiary care center was found to be rural rather than urban (which prefer a consultation with private sector endocrinologists and ophthalmologists). This again amounts to a higher prevalence of DR being observed in the rural population. In contrast, Alemu et al. illustrated this point by demonstrating that urban

dwellers had a significantly higher prevalence of retinopathy compared to rural patients, 16.1% and 5.0%, respectively.[7]

A population-based cross-sectional study was conducted to estimate the prevalence of type 2 diabetes mellitus and diabetic retinopathy in a rural population of South India. They found that the prevalence of diabetes in the rural Indian population was 10.4% (95% CI 10.39% to 10.42%), and that the prevalence of diabetic retinopathy, among patients with diabetes mellitus, was 10.3% (95% CI 8.53% to 11.97%).[5]

Conclusion

1. The overall prevalence of DR was found to be 52.5% among the patients reporting to a tertiary care diabetic and endocrinology center, in western Uttar Pradesh.
2. Out of the affected patients, 14.3% patients had a unilateral involvement and 85.7% patients had a bilateral involvement.
3. Mild NPDR was observed to be the most common stage. Severe NPDR, high risk PDR and ADED were found to be uncommon. This signifies a good control of the disease, minimizing the occurrence of severe grades of diabetic retinopathy, which are mainly responsible for vision loss.
4. The prevalence of DR was higher among rural patients as compared to urban patients. The rural population comprising the majority of sample population with a poor control of diabetes led to an earlier development of DR.

It is possible that selection bias may have affected our prevalence estimates. Our results also suggest the need for an eye care program to work more closely with internists for more effective coverage of diabetic subjects. This may require provision of additional training to internists for screening of retinopathy.[8] Our results suggest that many diabetic patients who consult internists do not currently receive referrals for eye examinations. Further studies are also required to understand the barriers that prevent patients from uptake of services offered through such screening programs, and to determine the costs of providing treatment to patients with diabetic retinopathy, and to determine better strategies for follow-up of subjects.

The prevalence of DR being higher among the rural population calls for an efficiently designed government policy to reach out the concerned population, with adequate recruitment of health care professionals for proper screening and timely intervention of the affected patients.

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