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Study of Prevalence of Retinopathy, it's Awareness and Associated Risk Factors in Type 2 DM Patients in Hadoti Region, Kota

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Abstract

***Introduction:** DM is one of the major systemic causes of blindness throughout the world. Diabetic retinopathy can be defined as damage to microvasculature in the retina by prolonged hyperglycaemia. Though multiple studies have been conducted to find out prevalence of DR and its awareness in various parts of India, it remains less explored in Hadoti region, Kota, Rajasthan, India.*

***Study design and material:** This is a hospital-based cross-sectional study conducted on patients attending the diabetic clinic in New Medical College Hospital, Kota. A total of 248 type 2 diabetes mellitus patients were screened with Carl Zeiss Retinoscope after taking informed and written consent. Anthropometric data of each subject was collected. Urine albumin and HbA1C levels were also noted. Furthermore, a special questionnaire was designed to assess awareness about diabetes-related eye disease among the patients.*

***Observation:** The overall prevalence of diabetic retinopathy was 8.87%, out of which 54.54% patients had NPDR and 45.45% patients had PDR. Out of the 22 patients with diabetic retinopathy, 16 had albuminuria, and 14 of them have had diabetes for more than 10 years.*

Out of 248 patients, 178 patients (71.77%) were aware about ophthalmological side-effects of DM, though only 74 of them (41.57%) visited an ophthalmologist for further check-up.

Out of the 70 patients unaware about ophthalmological s/e, 26 patients (37.14%) were illiterate.

***Conclusion:** This study concluded that prevalence of diabetic retinopathy in Hadoti region was 8.87%. and awareness about the illness was seen in 71.77% of the population. Furthermore, in our study educated patients were more aware (94.38%) about diabetic eye disease suggesting an association between the two. Early diagnosis via screening programme may help in formulation and implementation of effective intervention at the earliest. It will also help in reducing the economic burden on the government and society.*

Introduction:

India, the world's second most populous country, now has a greater number of people with type 2 diabetes than any other nation. Calling India the diabetes capital of the world, the 'International Journal of Diabetes in Developing Countries' says that there has been an alarming rise in the diabetic population[1]. The prevalence of diabetes mellitus is growing rapidly worldwide and is reaching epidemic proportions[4,5]. IDF expects a rise in number of people living with diabetes from 366 million in 2011 to 552 million by 2030, if no action is taken. In 2011, IDF estimated that India alone has 61.3 million diabetics[6].

DM is one of the key causes of blindness in the major part of the world. It is a heterogenous group of syndromes in which not only carbohydrate metabolism but metabolism of lipids and proteins is also deranged. This deregulation causes secondary pathophysiological changes in multiple organ systems and ultimately imposes a tremendous burden on the healthcare system. Diabetic retinopathy (DR) however, is an end-organ response to a systemic disease, representing only one of many microvascular and macrovascular diabetic complications. The newer evolving technologies have improved the diagnostic accuracy of screening methods and access of the diabetic patients to specialist care. In spite of this progress, it remains a significant cause of acquired visual loss in working-age adults worldwide. Patients with DR are 25 times more likely to be blind than non-diabetic patients of similar age and gender[7].

Up to 21% of patients with type 2 diabetes have retinopathy at the time of diagnosis and more than 60% of those with type 2 diabetes have some degree of retinopathy twenty years after diagnosis[2]. Although diabetic retinopathy does not cause obvious visual symptoms in earlier stages, it threatens the sight of the patient once Proliferative Diabetic Retinopathy (PDR) or macular oedema develops, according to the global update of available data on visual impairment in the year 2002[3].

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Epidemiologic studies and clinical trials have provided information on the incidence and prevalence of retinopathy and on the associated risk factors of retinopathy. Many important risk factors are identified to be related with progression of DR such as longer disease duration, higher levels of glycosylated haemoglobin, and presence of proteinuria[1,8,9]. Data on other factors including body mass index, male sex, education status have demonstrated varying results[1,8].

Various studies have been conducted to find out prevalence of DR, and its awareness in various part of India, yet it remains less explored in Hadoti region, Kota.

Material and method

This was a hospital-based cross-sectional study carried-out from January to December 2019, in the Diabetes Clinic, New Medical College Hospital, Kota (Rajasthan). The subjects were diabetic patients who were being treated in our clinic and agreed to participate in our study. All patients were diagnosed cases of T2DM and were on treatment.

248 patients were screened via Carl Zeiss Retinoscope machine after taking informed and written consent. Urine albumin and HbA1C levels, along with anthropometric and demographic data were collected for each subject. Besides, a special questionnaire was designed to find out awareness of diabetic-related eye disease among the subjects and association with education status was analysed *ad hoc*.

All patients had pupils dilated with 0.5% tropicamide (two drops in each eye). A single photograph centred on the macula was taken using Carl Zeiss Retinoscope with instantaneous picture development. An ophthalmologist was then given the fundal photographs to look for diabetic retinopathy; and if present, to examine whether it was proliferative or non-proliferative.

Inclusion criteria: Patients diagnosed with type 2 DM, who gave their consents for participation in the study.

Exclusion criteria: Patients with mature cataracts, history of exposure to radiation, hypertensive retinopathy without DM, sickle cell disease, and pheochromocytoma were also excluded, as these conditions could mimic fundus features with diabetic retinopathy.

An approval was obtained from the institutional ethics committee. Informed consents were taken from all the subjects.

Statistical analysis

Data was analysed by using epi-info statistical software. Mean, standard deviation, range and percentage were calculated. Prevalence of DR was calculated as the ratio of the number of participants with DR in one or both eyes to the total number of diabetic patients who were evaluated.

Result

Demographic profile of diabetic population under study (Values in parenthesis indicate age range, * Standard Deviation)

Table I:

No. of Participants (N = 248)	Age in years (Mean ± SD*)	Duration of diabetes in years (Mean ± SD*)	HBA1C (%) (Mean ± SD)
Male (N = 154)	56.80 ± 10.42	7.28 ± 6.51	8.34 ± 1.61
Female (N = 94)	51.32 ± 9.12	6.78 ± 6.74	8.23 ± 1.53

Table II shows the overall prevalence of diabetic retinopathy was 8.87%, out of which 54.54% patients had NPDR and 45.45% patients had PDR.

Table II: Prevalence of DR (total, NPDR and PDR).

Total no. of patients (pts)	Percentage of pts with *DR (Total)	Percentage of pts with #NPDR	Percentage of pts with †PDR
248	22 (8.87%)	12 (54.54%)	10 (45.45%)

*(Values in parenthesis indicate number of patients, *Diabetic retinopathy, #Non-proliferative diabetic retinopathy, †Proliferative diabetic retinopathy).*

Table III and IV show relation of diabetic retinopathy with other risk factors such as urinary albumin, duration of diabetes. 16 out of 22 diabetic patients with retinopathy (72.22%), had albuminuria (detected by spot urine albumin) whereas 90 out of 226 diabetic patients without retinopathy (39.82%) had albuminuria (p - value 0.0029; statistically significant at $p < 0.05$).

14 out of 22 subjects with retinopathy (63.33%) had disease duration of > 10 years whereas only 42 out of 226 patients (18.58%) without retinopathy had had the illness for more than 10 years (p - value 0.00001; statistically significant at $p < .05$).

Table III:

Category	No. of patients with urinary albumin (%)	No. of patients without urinary albumin (%)
Diabetic patients with retinopathy (N = 22)	16 (72.22%)	6 (27.78%)
Diabetic patients without retinopathy (N = 226)	90 (39.8%)	136 (60.18%)

Table V and 6: Out of 248 patients, 178 patients (71.77%) were aware about ophthalmological side-effects of DM, out of which only 74 patients (41.57%) visited ophthalmologist for further check up:

Table IV:

Category	No. of patients with DM duration > 10 yrs	No. of patients with DM duration < 10 yrs
Diabetic patients with retinopathy (N = 22)	14 (63.63%)	8 (36.37%)
Diabetic patients without retinopathy (N = 226)	42 (18.58%)	184 (81.42%)

Table V:

Total patients	Aware patients (%)	Male (%)	Female (%)
248	178 (71.77%)	118 (66.30%)	60 (33.70%)

Table VI:

Total patients (N)	Aware patients about ophthalmologic side-effects (%)	No. of patients who visited an ophthalmologist (%)	No. of patients who did not visit an ophthalmologist (%)
248	178 (71.77%)	74 (41.57%)	104 (58.43%)

Table VII:

Education status	No. of patients aware about ophthalmological side-effects	No. of patients unware about ophthalmological side-effects
Illiterate (N = 36)	10 (5.61%)	26 (37.14%)
Literate (N = 212)	168 (94.38%)	44 (62.86%)

Table VIII:

Education level of literate patients (N = 212)	Aware patients about diabetic eye disease	Unaware patients about diabetic eye disease
Up to primary level (63)	33 (52.38%)	30 (47.62%)
Up to secondary level (47)	36 (76.59%)	11 (23.41%)
Up to higher education or more (102)	99 (97.05%)	3 (2.95%)

Table VII and VIII shows relationship between education level and awareness about diabetic retinopathy which suggests that 168 out of 178 patients (94.38%) (who were aware about ophthalmological side-effects) were literate while 10 out of 178 (5.61%) were illiterate. On the other hand, out of 70 patients (who were unaware about ophthalmological side-effects) 37.14% patients were illiterate while 62.86% were literate. (p value - 0.00001, statistically significant at $p < .05$).

Among literate patients, 63 were educated up to the primary level, 47 up to the secondary level and 102 up to higher education level. Awareness among these group was found 52.38% (33 patients), 76.59% (36 patients), 97.05% (99 patients) respectively, which suggests that awareness increases as education level increases.

Table IX shows the source of information about diabetic eye disease among literate and illiterate patients which suggests that all illiterate patients (100%) got the information from medical personnel or treating doctor while for literate patients the major source was media (51.20%) (e.g., newspapers, magazines, books, etc.), followed by medical personnel (25%) and other patients (23.80%).

Table IX:

Education status (only aware patients)	Source of information about diabetic eye disease or side-effects		
	Other patients	Media	Medical personnel
Illiterate patients (N = 10)	NIL	NIL	10 (100%)
Literate patients (N = 168)	40 (23.80%)	86 (51.20%)	42 (25%)

Discussion

Diabetic retinopathy (DR) is a well-known complication of diabetes mellitus (DM). Prevalence of DR differs in type 1 and type 2 DM and also differs in different populations. Different population and hospital-based studies, which were done to establish prevalence of DR in diabetic populations, have been summarised in (Table X).

Table X:

Study and authors	Year	Region/area and type of population studied	Total No. of cases	% DR, % NPDR and % PDR
Present study Piyush Rameshchandra *et al*	2019 2009	Hadoti region, Kota (Raj) India, urban and rural Western India type 2 DM	248 168	8.87%,54.54%, 45.45%, 33.92 25.59, 8.33
Rema M *et al*[11]	1996	Urban and rural South Indian type 2 DM	6792	34.1, 30.8, 3.4
Agrawal RP *et al*[7]	2000	Urban and rural North India type 2 DM	4067	28.9, 23.06, 5.9
Narendran V *et al*[12]	2002	Urban and rural South India type 1 and type 2 DM	260	26.2, 24.6, 1.6
Rema M *et al*, CURES Eye study I[8]	2005	Urban South India Type 2 DM	1382	17.6, 16.6, 0.9
Mahesh G *et al*[13]	2005	Urban and rural South India type 1 and type 2 DM	323	20.12, 10.84,

Several studies from the world and India have also tried to find out prevalence of diabetic retinopathy, including its stages NPDR and PDR, in different populations from south, north and western India. The present study showed that the prevalence of diabetic retinopathy (DR) was 8.87% (NPDR - 54.54%, PDR - 45.45%) in type 2 DM patients of Hadoti region, Kota (Rajasthan).

Overall, prevalence of DR in our hospital-based study was

lower as compared to other epidemiological studies. This observation may be attributed to the fact that there was a referral bias among the diabetic patients who were reported to our clinic (as our study was mainly OPD based), small sample size, lower mean diabetes mellitus duration (7.28 ± 6.51 in male, and 6.78 ± 6.74 in female) as compared to other studies and lower mean HBA1C (8.34 ± 1.61 in male and 8.23 ± 1.53 in female).

On the basis of the questionnaire designed to assess awareness, we concluded that out of 248 patients, 178 patients (71.77%) were aware about ophthalmological side-effects of DM, out of which only 74 patients (41.57%) visited ophthalmologist for further check-up. Further questioning suggested that all patients who did visit an ophthalmologist were symptomatic, mostly presenting with blurring of vision and the rest who did not visit, were still asymptomatic. So, our study also suggests that the subjects tend to take professional help only after experiencing symptoms despite having knowledge about the disease.

Furthermore, an association between educational status and awareness about diabetic eye disease (DR) was also noted. In our study, literate patients were more informed (94.38% v/s 5.61%) about diabetic eye disease than illiterate patients. The latter group came to know about it from their treating physicians, hence our study suggests that doctors play a great role in enhancing awareness of diabetic related eye disease, especially in the illiterate and socially backward class.

Limitations and strengths of our study

Smaller sample sizes, referral bias and cross-sectional study are major limitations due to which results are difficult to extrapolate to larger populations. Its strength lies in the fact that it was the first of its kind which assessed the prevalence of DR in Hadoti region, Kota, by using retinal photographs.

Conclusion

This study concluded that prevalence of diabetic retinopathy in Hadoti region was 8.87%, and 71.77% were cognizant of the disease. Early diagnosis via screening programme may help in formulation, implementation of effective intervention at the earliest, and reducing the economic burden on government and society.

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