Prevalence of Diabetic Retinopathy - A Hospital Based Study

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ABSTRACT

BACKGROUND

In India, with the epidemic increase in type 2 diabetes mellitus, as reported by the World Health Organization (WHO), diabetic retinopathy is fast becoming an important cause of visual disability. Visual disability from diabetes is a significant public health problem. However, this morbidity is largely preventable and treatable. If managed with timely intervention, the quality of life can be preserved. Duration of diabetes, type of diabetes, control of blood sugar, associated systemic conditions, age and sex are found to be associated with retinopathy and its progression. We wanted to study the prevalence of diabetic retinopathy.

METHODS

This is an observational cross-sectional study conducted in the Department of Ophthalmology, Sri Ram Narayan Ruia Government General Hospital attached to Sri Venkateswara Medical College, Tirupathi. A total of 500 cases of diabetes fulfilling the inclusion criteria were examined as per protocol and results were analysed.

RESULTS

Prevalence of diabetic retinopathy in our study was 35.2% (176 patients out of 500). Prevalence of sight threatening diabetic retinopathy was 12% (vision <6/60).

CONCLUSIONS

In the present study, the prevalence of Diabetic Retinopathy was 35.2%. There was a strong association between the duration of diabetes and retinopathy changes. The severity of diabetes was not related to duration of diabetes. The risk factors in the present study are hypertension, obesity and hyperlipidaemia. Majority of the patients had renal involvement. As retinopathy changes were directly related to the diabetic duration of the patient, regular mass screening programmes must be conducted to identify the retinopathy changes in the early stages. This helps in educating the patient about the ill effects and consequences of progression of Diabetic Retinopathy. All diabetic patients attending the hospital must undergo screening for retinopathy. This can be achieved by conducting awareness programmes to the public.

KEYWORDS

Diabetic retinopathy, Clinically Significant Macular Oedema, Hypertension, Hyperlipidaemia

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BACKGROUND

Diabetes represents a spectrum of metabolic disorders, which has become a major health challenge world-wide. Diabetic retinopathy (DR) is a major cause of blindness among the working age group. Diabetic retinopathy (DR) is a vascular disorder affecting the microvasculature of the retina. DR occurs both in type 1 and type 2 diabetes mellitus and it has been shown, in the earlier epidemiological studies,[1,2] that nearly all type 1 and 75% of type 2 diabetics will develop DR after 15 years of duration of diabetes. Diabetes constitutes about 2% of the world population, of these 10-15% are type 1 and rest type 2. As the world wide prevalence of diabetes mellitus continues to increase, diabetic retinopathy remains a leading cause of vision loss in many developed and developing countries. Around 20% of people with diabetes are projected to develop retinopathy. The global prevalence of diabetes mellitus was estimated around 171 million and expected to increase to 360 million by the year 2030. In India alone, the prevalence of diabetes is expected to increase from 41.7 million in 2000 to 79.4 million in 2030.[3] A national survey of diabetes conducted in six major cities in India in the year 2000 has shown that the prevalence of diabetes in urban Indian adults was 12.1%.[4] The onset of diabetes among Indians is about a decade earlier than their western counterparts and this has been noted in Asian Indians in several studies.[5] In the national survey, 54.1% of diabetics developed diabetes in the most productive years of their lives i.e. before the age of 50 years and they also had a higher risk of developing chronic complications of diabetes. According to Chennai Urban Rural Epidemiological Study (CURES) the prevalence of DR in urban Chennai is 17.6%. Aravind Comprehensive Eye Study reported the prevalence of DR in rural south India to be 10.5%.

We wanted to estimate the prevalence of diabetic retinopathy in type 2 diabetics and determine the demographic characteristics of diabetic retinopathy among type 2 diabetic patients attending the ophthalmic OPD S.V.R.R.G.G.H, Tirupathi.

METHODS

This is a hospital based observational study conducted between Feb 2016 to August 2017 for a period of 18 months at Department of Ophthalmology Sri Venkateswara Ramnarain Ruia Government General Hospital (S.V.R.R.G.G.H), Tirupathi. In the present study 500 Type 2 diabetic patients attending the outpatient department of Ophthalmology and those referred from other departments of S.V.R.R.G.G.H. were screened for diabetic retinopathy from February 2016 to August 2017 for a period of 18 months at Department of Ophthalmology S.V.R.R.G.G.H, Tirupathi. Patients diagnosed with type 2 diabetes mellitus were included in the study. Diabetic patients with hazy ocular media and patients not willing to participate in the study were excluded from the study.

RESULTS

In the present study 500 Type 2 diabetic patients attending the outpatient department of Ophthalmology, S.V.R.R.G.G. Hospital Tirupati and referred from other departments of S.V.R.R.G.G. Hospital, Tirupati were screened for Diabetic retinopathy changes. In the present study age of the patients ranged from 41 to 79 years. Majority of the patients were between 41-60 years of age i.e. 83.4%. Of the 500 patients screened, 303 (60.60%) were males and 197 (39.40%) were females. In majority i.e. 420 patients (84%) the duration of diabetes was between 0-10 years. majority of patients' occupation was business i.e. 178 (35.60%) followed by home-makers i.e. 176 (35.2%). Out of 112 (22.4%) agriculture patients, 107 (95.5%) were living in rural area and 5 (4.5%) living in urban area. Out of 178 (35.6%) business patients, 16 (9%) were living in rural area and 162 (91%) living in urban area. Out of 176 (35.2%) home makers, 125 (71%) were living in rural area and 51 (29%) living in urban area. Others are 34 (6.8%), of these 6 (17.6%) were living in rural area and 28 (82.4%) living in urban area.

Majority of the patients had no family history of diabetes i.e. 454 (90.8%), only 46 (9.2%) patients had family history. 150 (30%) diabetic patients had hypertension and 350 (70%) patients had no hypertension. In the present study 46 (9.2%) diabetic patients had hyperlipidaemia and 454 (90.8%) had no hyperlipidaemia. In the present study 37.2% were taking alcohol, 34.90% were smokers and 27.95 of the patients were obese (as calculated by BMI and height & weight chart). Total 500 diabetic patients are taking medications, majority 294 (58.8%) patients taking oral medication and 145 (29%) patients taking insulin.

In the present study 61 (12.2%) were taking insulin + oral medication. Renal involvement was observed in 47 (56%) patients, 26 (31%) patients had CAD and 11 patients (13%) had CVA. majority 31 (38.75%) hypertensive patients had moderate NPDR followed by 17 (21.25%) patients had mild NPDR. 6 (35.29%) patients with hyperlipidaemia had mild NPDR and 3 (17.65%) patients had early PDR. majority 131 (74.43%) diabetic retinopathy patients had no CSME, only 45 (25.57%) patients had CSME.

In the present study, to calculate the prevalence of diabetic retinopathy we have grouped the patients based on retinopathy level in worse eye. (as per Rizath, M.M.A.- A., et al. (2015) Prevalence of Diabetic Retinopathy among Diabetes: A Hospital Based Study at Ashraff Memorial Hospital, Kalmunai).[6] The prevalence of diabetic retinopathy was 35.2%. Majority of the patients had no retinopathy i.e. 324 (64.8%).

In the present study, prevalence of DR was directly proportional to duration of diabetes. The severity of diabetic retinopathy was not related to the duration of diabetes. 0-10 yrs. duration of diabetes had 30% prevalence, 11-20 yrs. had 60.27% prevalence and 21-30 yrs. had 85.7% prevalence.

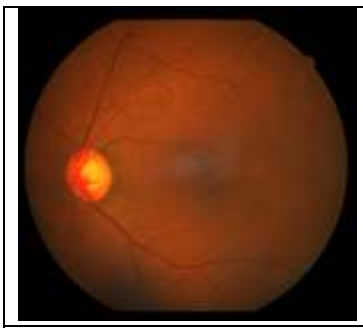

Figure 1.
Mild NPDR

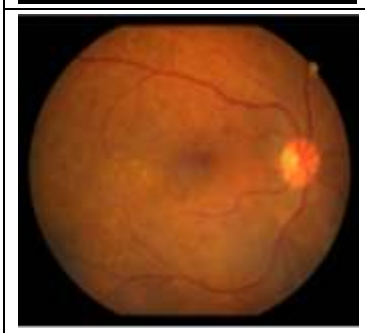

Figure 2.
Moderate NPDR

Figure 3.
Severe NPDR

Figure 4.
Early PDR

Figure 5.
High Risk PDR

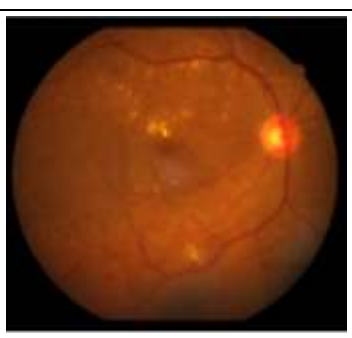

Figure 6.
Severe NPDR with CSME

Grading of DR	No. of Patients	(%)
No retinopathy	324	64.80
Mild NPDR	41	8.20
Moderate NPDR	73	14.60
Severe NPDR	24	4.80
Early PDR	10	2.00
High risk PDR	28	5.60
Total	500	100

Table 1. Grading of Diabetic Retinopathy

Grading of Diabetic Retinopathy	Duration of Diabetes					
	0-10 Yrs.		11-20 Yrs.		21-30 Yrs.	
	No.	%	No.	%	No.	%
No retinopathy	294	70.00	29	39.73	1	14.29
Mild NPDR	32	7.62	7	9.59	2	28.57
Moderate NPDR	54	12.86	17	23.29	2	28.57
Severe NPDR	15	3.57	9	12.33	0	0
Early PDR	7	1.67	3	4.11	0	0
High risk PDR	18	4.29	8	10.96	2	28.57
Total	420	100	73	100	7	100

Table 2. Prevalence of DR in Relation to Duration of Diabetes
(p=0, statistically significant)

DISCUSSION

Diabetic retinopathy is a major cause of blindness with public implications in India. DR is one of the leading causes of blindness in developed countries and its magnitude is increasing in alarming proportions in developing countries. The present study was a hospital-based study aimed to estimate the prevalence of Diabetic Retinopathy. In the present study a total of 500 diabetic patients were screened for diabetic retinopathy. Screening was done with slit lamp 90D lens, direct and indirect ophthalmoscopy and fundus photography. In the present study 60.6% were males as compared to females 39.4%. This is explained by the fact that males were earning members of the family and so sought medical advice early. Majority of diabetic patients 83.4% in the present study were between 41-60 years of age. The age presentation ranged from 41-79 years. Home makers and business as occupation formed largest group in our study i.e. 70.8%. Majority 294 (58.8%) patients taking oral medication, 145 (29%) patients taking insulin and 61 (12.2%) were taking insulin and oral medication. In majority of patients the duration of diabetes was between 0-10 years i.e. 84%-88% of eyes had good BCVA but severe visual impairment was observed in 12% of eyes 63.

Prevalence of Diabetic Retinopathy

Out of 500 patients with 1000 eyes screened, in 17 eyes retinopathy could not be graded due to dense cataract in 16 eyes and adherent leucoma in one eye. Retinopathy of the worse eye was considered to calculate the prevalence of retinopathy (as per Rizath, M.M.A.-A., et al. (2015) Prevalence of Diabetic Retinopathy among Diabetes: A Hospital Based Study at Ashraff Memorial Hospital, Kalmunai).[6] The prevalence of diabetic retinopathy in our study was 35.2% (176 patients out of 500). The severity of diabetic retinopathy was graded according to ETDRS classification.[7] Prevalence of sight threatening diabetic retinopathy was 12%. (vision <6/60). The overall prevalence of DR i.e. 35.2% in our study was quite comparable to other studies. In WESDR (The Wisconsin

Epidemiologic Study of Diabetic Retinopathy), the prevalence ranged between 25 to 40% in type 2 diabetics.[8] Rema H, Ponnaiya H, Mohan V, in a clinic population of a cohort of 6792 type 2 diabetes patients, the prevalence of DR was found to be 34.1%, the prevalence included 30.8% with NPDR, 3.4% P.D.R. and 6.4% of diabetic macular edema.[9] In our study, the prevalence of DR was found to be 35.2%, the prevalence included 27.6% with NPDR, 7.6% PDR and 25.57% with macular oedema. In the CODIAB study.[10,11] the sample was mainly hospital based, limited to a small number of patients more so of type II diabetes. The prevalence of any DR, proliferative DR and macular oedema was 33%, 3.3% and 5.6%. The results of this study are quite comparable to the results of our study as both of these are hospital based studies. A hospital- based study cross sectional study conducted in the year 2013 in western Indian type 2 diabetic population by Rameshchandra R et al. found the prevalence of diabetic retinopathy to be 33.9%.[12] Prevalence of Diabetic Retinopathy a hospital based study conducted at Oman by R Khandekar et al. In the year 2003, found the prevalence of DR was 14.39%.[13] Prevalence of Diabetic Retinopathy among diabetics a hospital based study conducted at Ashraff Memorial Hospital, Kalmunai by Rizath, M.M.A.-A., in the year 2015 found the prevalence of DR was 13.6%.[6] Prevalence of Diabetic Retinopathy a hospital based study conducted in the year 2013 at Kashmir by Tariq Qureshi et al. showed the prevalence of DR was 27%.[14] Prevalence of Diabetic Retinopathy conducted by Dr Rajkumar Patra et al. in the year 2017 in Narayana medical college, Nellore showed the prevalence of DR was 27.6%.[15] Prevalence of Diabetic Retinopathy in RIMS Srikakulam, a hospital based study conducted by Surya Chandra Mallireddy et al. in the year 2015 in 500 diabetic patients, the prevalence found to be 30.6%.[16] Prevalence of Diabetic Retinopathy in type 2 diabetes mellitus patients conducted by Koushiki Mani et al. in a tertiary care hospital in Alappuzha, Kerala in the year 2017showed the prevalence of DR was 31.5%.[17]

Age Wise Analysis

In our study, the predominant age group is between 41-60 years which was quite similar to other studies.

Sex Wise Analysis

In the present study, males were 303 (60.6%) and females were 197 (39.4%). This is explained by the fact that males were earning members of the family and so sought medical advice early.

Duration Wise Analysis

In our study majority of patients 420 (84%) has duration of diabetes between 0-10 years where in other studies also majority patients were in the same duration range 0-10 years.

Visual Acuity Wise Analysis

In the present study majority of the eyes 880 (88%) had good BCVA and 120 (12%) eyes had sight threatening visual acuity (<6/60, STVA), which is quite similar to other studies.

Risk Factors Wise Analysis

In the present study hypertensive patients were 150 (30%) and hyperlipidaemia patients were 46 (9.2%) which is quite comparable to R Khandekar et al. study.

End Organ Diseases Analysis

In the present study majority of patients 45 (53.57%) had renal problem and cardiac patients were 27 (32.15%) and 12 (14.28%) patients had stroke attacks. Our study is quite similar to Salil S Gadkari et al. study[18]

Treatment Wise Analysis

In the present study majority of patients 294 (58.8%) were on oral hypoglycaemic drugs, 145 (29%) patients were on insulin and 61 (12.2%) patients were on both oral + insulin treatment, which is quite similar to studies.

Grading of Diabetic Retinopathy Analysis

In our study Mild NPDR were 41 (8.2%) patients, Moderate NPDR were 73 (14.6%), Severe NPDR were 24 (4.8%) and PDR were 38 (7.6%) patients. Our study was quite similar to other studies.

Grading of DR	Present Study	Rameshchandra R et al (2013)[12]	Koushiki M et al (2017)[17]
Mild NPDR	8.2%	3%	7.5%
Moderate NPDR	14.6%	2.4%	7.5%
Severe NPDR	4.8%	20.2%	7.5%
PDR	7.6%	8.3%	18%

Table 3. Comparative Study of Diabetic Retinopathy

DR with CSME Analysis

In our study DR with CSME were 45 (25.57%) patients which is relatively high to other studies.

Prevalence of Diabetic Retinopathy Analysis

In the present study prevalence of diabetic retinopathy was 35.2% (176 out of 500 patients). Our results are consistent with those of Piyush Rameshchandra R et al.[12] in (2103) whose study included 168 diabetic patients and observed a prevalence of Diabetic Retinopathy as 33.9%. But comparing to Piyush Rameshchandra R et.al[12] study, our study sample size is more (i.e. 500). Koushiki Mani et al. study[17] in (2017) showed a prevalence of 31.5%, whose study included 200 diabetic patients. Prevalence of NPDR was 27.6% and PDR was 7.6%, matched well with those which were observed by Piyush Rameshchandra R et al.[12] where NPDR was 25.6% and PDR was 8.3%. Prevalence of Diabetic Retinopathy also varies in population based and hospital-based studies. Overall, prevalence of Diabetic Retinopathy in hospital based studies including present study was higher as compared to those in population based epidemiological studies. This may be due to the fact that there was a referral bias among the diabetic patients who were reported to tertiary care centres. Therefore, with larger number of diabetics reporting to the tertiary hospital, it is more likely that prevalence of complications may also be larger.[17] A population based study conducted by Salil S Gadkari et al.[18] in the year 2014 showed a prevalence of diabetic retinopathy was 21.7% which was less than our present study as it is a hospital based study.

Salil S Gadkari et al. study[18] included both type 1 and type 2 diabetic patients and confirmed only by the presence or absence of Diabetic Retinopathy and does not graded Diabetic Retinopathy. In the present study, we observed an association between duration of diabetes and diabetic retinopathy ($p<0.05$). This result supported the fact that duration of diabetes is the strongest predictor for development of Diabetic Retinopathy. In other studies, prevalence of retinopathy at diagnosis varies from 20-60%. The observed geographic/population variations in the prevalence of DR could be due to real ethnic differences in the susceptibility to DR (genetic) or due to poor control of diabetes and influence of socio-economic and cultural factors (environmental). In our study prevalence of DR was 35.2%, which was quite similar to other studies.

Studies	Prevalence (%)
Present study	35.2%
Rameshchandra R et al. (2013)[12]	33.9%
Koushiki Mini et al. (2015)[17]	31.5%
Surya Chandra M et al. (2015)[16]	30.6%
Dr.Rajkumar Patra et al. (2017)[15]	27.6%
Tarish Qureshi et al. (2013)[14]	27%

Table 4. Comparative Study of DR Prevalence

In our study, the prevalence of Diabetic Retinopathy is 35.2% which is a hospital-based study and prevalence is different from population based studies.

Studies	Prevalence (%)
V Narendran et al. (2001)[19]	26.2%
Nirmalan PK et al. (2004)[20]	10.5%
Rema M et al (2005)[21]	17.6%
Raman R et al. (2009)[22]	185
Salil S Gadkari et al. (2014)[18]	21.7%

Table 5. Comparative Study from Population Based Studies

According to Chennai Urban Rural Epidemiological Study (CURES) conducted in the year 2005 in 1529 known diabetic patients, the prevalence of DR in urban Chennai was 17.6%. Aravind Comprehensive Eye Study conducted in the year 2004 reported the prevalence of DR in rural south India to be 10.5%.

CONCLUSIONS

In the present study, the prevalence of Diabetic Retinopathy was 35.2%. There was a strong association between the duration of diabetes and retinopathy changes. The severity of diabetes was not related to duration of diabetes in the present study. The risk factors in the present study were hypertension, obesity and hyperlipidaemia. Majority of the patients had renal involvement. As retinopathy changes were directly related to the diabetic age of the patient, regular mass screening programmes must be conducted to identify the retinopathy changes in the early stages. This helps in educating the patient about the ill effects and consequences of progression of Diabetic Retinopathy. All diabetic patients attending the hospital must undergo screening for retinopathy. This can be achieved by conducting awareness programmes to educate the public.

Strengths

1. Screening of all diabetic patients helped in identifying retinopathy at an early stage.
2. As this is a hospital-based study, referral from other departments helped in creating awareness among patients about the importance of regular ophthalmic screening.
3. Thorough screening of all diabetic patients for the severity of retinopathy in identifying comorbid conditions and properly guiding the patient for further management.

Limitations

1. This was a hospital-based study, so there was a referral bias.
2. The actual prevalence of diabetic retinopathy may have been underestimated.
3. No further follow up of the patient.

Recommendations

1. Further intervention studies with long term follow are required to plan proper management.
2. OCT, a non-invasive procedure helps in detecting macular oedema at an early stage. OCT screening in all diabetic patients with suspected macular oedema is helpful in preventing blindness due to macular oedema.

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