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Prevalence of Diabetic Retinopathy and Associated Factors in Type 2 Diabetes in a Tertiary Care Centre in Kannur District of Kerala

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ABSTRACT

Background: The purpose of this study is to determine the prevalence in diabetic retinopathy in type 2 diabetic (DM) patients and to establish associated factors. **Methods:** Hospital based descriptive study was conducted from April 2017 to March 2018 in the Department Of Ophthalmology, Govt Medical College Kannur, Pariyaram Known diabetics were evaluated for the prevalence of diabetic retinopathy (DR) and to establish relation with age, sex, duration of diabetes, type of medications, hypertension, end organ disease, HbA1c, body mass index. **Results:** Out of 293 patients with type 2 DM, 182 (62.1%) were males and 111(37.9%) female. Mean patient age was 56.7 ± 11.2 years, with duration of diabetic less than 10yrs 185(63.1%) and for more than or equal to 10 yrs. 108(36.9%). Majority of the patients 228 (77.8%) were on oral hypoglycemic agents, 26 (8.9%) on insulin and 39 (13.3%) on both. **Conclusion:** Prevalence of DR is high in our study132(45.1%) and DR is significantly associated with male gender, older age, longer duration of diabetic state, poorly controlled blood sugars (HbA1c levels) and in patients with hypertension.

Keywords: Diabetes mellitus, Diabetic retinopathy Glycosylated haemoglobin.

INTRODUCTION

Diabetes mellitus (DM) is an important health care problem in India. According to WHO, 31.7 million people were affected by diabetes in India in the year 2000. This figure is estimated to rise to 79.4 million by 2030, the largest number in any nation in the world. It is estimated that two-third of all Type 2 and almost all Type 1 diabetics are expected to develop diabetic retinopathy over a period of time.[1-3]

Diabetic retinopathy (DR) is a potentially blinding and visually disabling complication of diabetes that eventually develops in nearly all patients with type1diabetes and a high proportion of patients with type 2 diabetes.[4-5] Blindness and visual impairment due to DR is preventable,[8] but requires adequate screening for both diabetes and DR to identify and treat those patients at risk. The purpose of our study was to assess prevalence and associated factors for diabetic retinopathy.

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MATERIALS AND METHODS

After obtaining approval of the institutional ethics committee, a hospital based descriptive study was carried out at Department of Ophthalmology, in all self-reported type 2 diabetic patients after obtaining an informed consent from participants. A pretested proforma was used for data collection, which included information regarding socio-demographic details, duration of diabetes, type of medications and other co-morbidities.

All study patients underwent a detailed ocular examination which included assessment of visual acuity using a standard Snellen's chart. Biomicroscopy of the anterior segment was done to document any abnormalities and intraocular pressure was assessed using a Schiotz tonometer. Inclusion criteria included all patients with type 2 diabetes and other systemic diseases, patients with fundus changes other than diabetic retinopathy were excluded from the study (hypertension, anemia, vasculitis etc).

One drop each of phenylephrine 10% and tropicamide 1% was then instilled into both eyes and the drops were repeated till the best possible mydriasis was obtained. For fundus examination both slit lamp biomicroscopy and indirect

ophthalmoscopy was done. The minimal criteria for diagnosis of diabetic retinopathy were the presence of at least two microaneurysms in any field. Retinopathy was classified as No DR, Mild NPDR, Moderate NPDR, Severe NPDR, PDR, Diabetic macular edema. Due to limited resources fundus photography was not performed. The height and weight were recorded and the body mass index (BMI) was calculated using the formula: - weight (kg) divided by height square (m2).Glycosylated haemoglobin (HbAlc) was done using Beckman Coulter AU5800.

Statistics

Data entry was done using Microsoft Excel 2007and analysis of data by SPSS version 17. Prevalence of DR was estimated by frequency. Association of DR with other factors was done using chi-square test and student's t-test. A "P" value less than 0.05 will be considered significant.

RESULTS

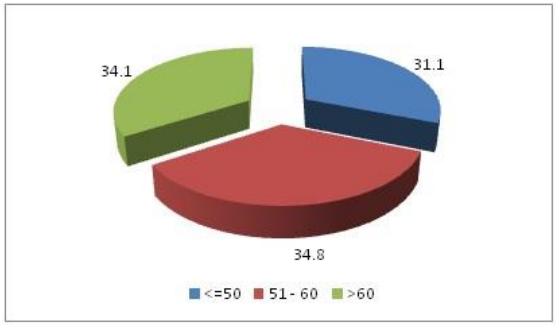

Figure 1: Percentage distribution according to age

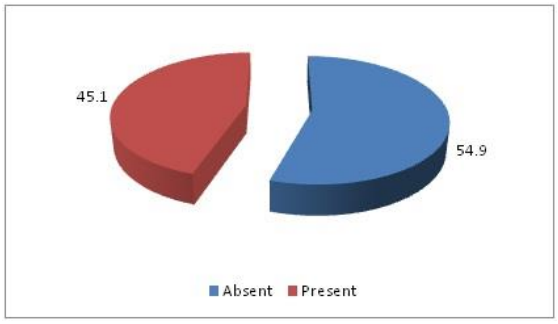

Figure 2: Prevalence of diabetic retinopathy.

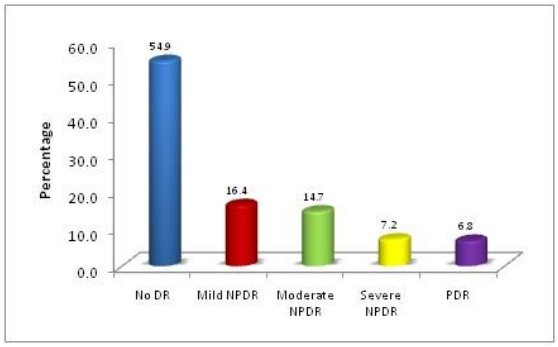

Figure 3: Percentage distribution of diabetic retinopathy

The study population consisted of 293 patients with type 2 DM, 182 (62.1%) were males and 111(37.9%) female. Mean patient age was 56.7 ± 11.2 years [figure 1], with duration of diabetic less than 10yrs 185(63.1%) and for more than or equal to 10 yrs. 108 (36.9%) [Table 1]. Majority of the patients 228 (77.8%) were on oral hypoglycemic agents, 26 (8.9) on insulin and 39 (13.3%) on both.

Prevalence of diabetic retinopathy was detected in 132(45.1%) patients [figure 2], of these patients with diabetic retinopathy, 16.4% have Mild NPDR which occurred most frequently, moderate NPDR were 14.7%, severe NPDR 7.2% , PDR in 6.8% and 7.5% have Diabetic Macular Edema [Figure 3,4].

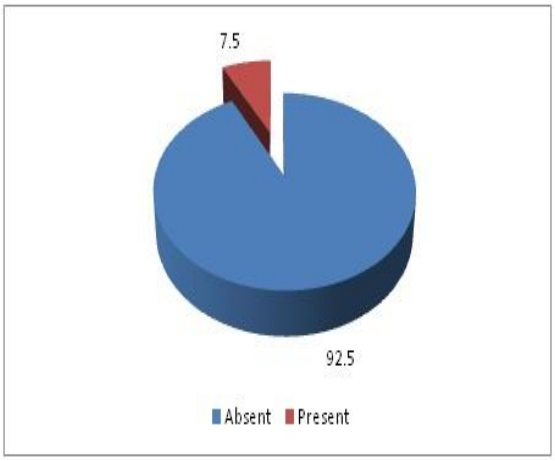

Figure 4: Percentage distribution of diabetic macular edema

Table 1: Percentage distribution of the sample according to duration of diabetes mellitus

Duration of DM in years	Count	Percent
<10	185	63.1
>=10	108	36.9
Mean ± SD	8.3 ± 6.7	

Diabetic retinopathy was higher in male patients 86(47.3%), in the age group more than 60 yrs. 54(54.0%), with diabetes more than or equal to 10 yrs. 64(59.3%), who are on both oral hypoglycemic and insulin 24 (61.5%), HbA1c levels more than or equal to 7%, 110(45.1%), lesser BMI 2 (66.7%) [Table 3], hypertensive patients 70 (47.6%), with history of vascular accidents (P=0.013) and in patients with diabetic nephropathy (P=0.013) [Table 4].

Table 2: Percentage distribution of the sample according to HTN/ end organ disease

HTN/End organ disease	Count	Percent
HTN	147	50.2
CVA	5	1.7
CKD	16	5.5
CAD	15	5.1
Others(peripheral neuropathy, diabetic foot)	13	4.4

Table 3: Comparison of selected variables based on fundus

		Fundus – Diabetic Retinopathy				χ^2	P
		Absent		Present			
		Count	Percent	Count	Percent		
Age	<=50	57	62.6	34	37.4	5.56	0.062
	51 – 60	58	56.9	44	43.1		
	>60	46	46.0	54	54.0		
Sex	Male	96	52.7	86	47.3	0.94	0.332
	Female	65	58.6	46	41.4		
DM	<10	117	63.2	68	36.8	13.95	P<0.01
	>=10	44	40.7	64	59.3		
Type of medication	OHA	133	58.3	95	41.7	5.59	0.061
	Insulin	13	50.0	13	50.0		
	Both	15	38.5	24	61.5		
HbA1c	<7	27	55.1	22	44.9	0	0.981
	>=7	134	54.9	110	45.1		
BMI	Under weight	1	33.3	2	66.7	5.66	0.129
	Normal weight	79	52.0	73	48.0		
	Over weight	60	54.5	50	45.5		
	Obese	21	75.0	7	25.0		

Table 4: Comparison of HTN and end organ disease based on diabetic retinopathy: * P value significant at 0.05 level

HTN/End organ disease		Diabetic retinopathy				χ^2	P
		Absent		Present			
		Count	Percent	Count	Percent		
HTN	Absent	84	57.5	62	42.5	0.79	0.375
	Present	77	52.4	70	47.6		
CVA	Absent	161	55.9	127	44.1	6.2*	0.013
	Present	0	0.0	5	100.0		
CKD	Absent	157	56.7	120	43.3	6.13*	0.013
	Present	4	25.0	12	75.0		
CAD	Absent	154	55.4	124	44.6	0.44	0.508
	Present	7	46.7	8	53.3		
Others	Absent	155	55.4	125	44.6	0.43	0.514
	Present	6	46.2	7	53.8		

DISCUSSION

The overall prevalence of DR in this study is 45.1%. There is a wide variation in the prevalence in various studies across the globe. The previous studies to calculate prevalence were by Piyush Ramesh Chandra Ramavat et al. (33.92%),[9] Koshiki M et al. (31.5%),[7] Bansal P et al. (32%),[10] RP Agrawal et al. (28.9%).[11] Global reported studies of prevalence such as Ma. Florentina FG et al. (61.8%) in Philippines,[12] Muhammed K et al. (52.4%) in Pakistan.[14] The prevalence of DR was noted to be 42.1% in a study conducted by Adeyinka A et al in Nigeria and our study results are closer this study.[13] Like in many other studies, males (47.3%) were more affected, in our study which is similar to the study that has been reported by Karma L B et al.[18] The duration of diabetes is probably the strongest predictor for development and progression of retinopathy. In the Wisconsin Epidemiologic Study of Diabetic Retinopathy (WESDR), the widest and most prolonged population based ophthalmologic survey, reported that higher prevalence of DR was associated with longer duration of diabetes.[15] In India, virtually all studies have shown an increased prevalence of DR as the duration of diabetes increased.[6,21] In the study conducted by Dandona et al,[6] reported that 87.5 per cent of those with more than15yrs duration of diabetes had DR compared with 18.9 per cent of those who had less than 15 yrs. duration. According to Bansal P,[10] et al duration of diabetes was directly associated with diabetic retinopathy which is similar to our study (59.3%) with duration more than or equal to 10 years (P =0.01).

In our study patients with both oral hypoglycemic and insulin users had 61.5% DR. There is a strong evidence which suggest that the development and progression of DR is influenced by the level of hyperglycemia.[21] In our study 45.1% of patients with HbA1c more than or equal to 7% had diabetic retinopathy.[11] Hypertension is a highly co-morbid condition in diabetic patients. The UKPDS showed that the incidence of retinopathy was associated with systolic blood pressure. In Indian scenario hypertension was not a significant confounding factor in the CURES Eye study, however uncontrolled hypertension did influence the progression of DR. Similarly in our study hypertensive patients had 47.6 % DR, which was higher compared to the nonhypertensive group (42.5%).[9,11] Patients with end organ diseases like vascular accidents (100%) P=0.013 and diabetic nephropathy (75%) P= 0.013 was statistically significant in our study, concurrent presence of retinopathy, nephropathy and vascular accidents is reasonably high in this study.

The relationship between BMI and DR has been examined in a number of epidemiologic studies yielding inconsistent results. Most studies have reported a significant association between high BMI and obesity with DR.[17] Conversely, others have reported an association between low BMI and DR suggesting a possible protective role for higher BMI in the development of DR.[19] This lack of consensus may be partly due to methodological differences, differences in study participants, lack of comprehensive anthropometric measurements, inadequate clinical sample size, and particularly racial or ethnic differences since a negative correlation of BMI and DR was found in Asian populations. Our study findings concur with those studies that have reported an increased risk of DR in patients with low BMI (66.7%).[19] According to Yue Zhou et al.[20] when BMI was analyzed, neither being overweight nor obesity was associated with an increased risk of DR when compared with normal weight.

The principal drawback of this study is lack of fundus photography, relatively small sample size and patients with coexisting hypertensive retinopathy were not included.

CONCLUSION

This study disclosed high prevalence of diabetes retinopathy (DR), since it is a hospital based study it provides additional information like existing comorbidities which influence DR. Our research results clearly evidence the fact that DR is significantly associated with older age, longer duration of diabetic state, poorly controlled blood sugar (HbA1c), hypertension, nephropathy and vascular accidents. Thus, diabetic retinopathy is of multifactorial origin, and no single cause can be attributed to it.

REFERENCES

1. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: Estimates for the year 2000 and projections for 2030.Diabetes Care 2004; 27:1047-53.
2. Prevention of Blindness from Diabetic Retinopathy. Report of a WHO Consultation, Geneva; November, 2005.
3. Guidelines for the Comprehensive Management of Diabetic Retinopathy in India. A VISION 2020 the Right to Sight India Publication; July, 2008.
4. Keen H, Lee Et, Russell D, Miki E, Bennett PH, Lu M et al. The appearance of retinopathy and progression to proliferative retinopathy: The WHO multinational study of vascular disease in diabetes. Diabetologia 2001(suppl); 44:s22-30
5. K. Sacha E. Diabetic retinopathy. Current opinion on pathophysiology, diagnostics and therapy. PrezeglLek 2005; 62:238-42.
6. Dandona L, Dandona R, Naduvilath T J, McCarty C A, Rao G N. Population based assessment of diabetic retinopathy in an urban population in southern India. Br J Ophthalmol. 1999; 83:937–940.
7. Koushiki M, Rose D C.Prevalence of diabetic retinopathy in type 2 diabetes mellitus patients attending medicine out-patient department of a tertiary carehospital in Alappuzha, Kerala, India . Int J Res Med Sci. 2017 Apr;5(4):1532-1536.
8. Kanski JJ. Diabetic retinopathy—a preventable cause of blindness. Practitioner 1985; 229: 343-8.
9. Piyush Rameshchandra Ramavat, Manish R R, Balaji W G, Rohini G V, Manjiri U J. Prevalance of diabetic retinopathy in western India Type 2 diabetic population. A Hospital- based cross-sectional study. J ClinDiagn Res.2013 Jul, 7(7):1387-1390.
10. Bansal P,Gupta RP, Kotecha M.Frequency of diabetic retinopathy in patients with diabetes mellitus and its correlation with duration of diabetes mellitus.Med J DY Patil Univ 2013;6:366-9.
11. .R P Agrawal, M Ranka, R Beniwal, S R Gothwal, G C Jain, D K Kochar, et al Prevalence of diabetic retinopathy in type 2 diabetesin relation to risk factors:Hospital based study. INT. J. DIAB. DEV. COUNTRIES (2003), VOL. 23.
12. . Ma. Florentina FG, Harvey S. Uy . Prevalence of diabetic retinopathy among diabetic patients in a tertiary hospital . PHILIPP J OPHTHALMOL 2005; 30(4): 178-180.
13. Adeyinka A ,Avodeji A, Modupe K, Bolutife O, Ezekiel A, Adesoji F et al. Retinopathy among type 2 diabetic patients seen in tertiary hospital in Nigeria: a preliminary report . Clin Ophthalmol.2008 Mar;2(1):103-108.
14. 14. Muhammad K, Munaza J, Muhammad F, Hamama T B. Diabetic Retinopathy in type 2 Diabetes. JRMC ; 2013;17(2):257-259 257
15. 15.Klein R, Davis MD, Moss SE, Klein BE, DE Mets DL. The Wisconsin Epidemiologic Study of Diabetic Retinopathy. A comparison of retinopathy in younger and older onset diabetic persons. Adv. Exp Med Biol1985; 189: 321-35.
16. 16.Klein R, Klein BEK, Moss SE. Is obesity related to microvascular and macrovascular complications in diabetes? The Wisconsin epidemiologic study of diabetic retinopathy. Archives of Internal Medicine.1997; 157(6):650–656.
17. 17.Lim LS, Shyong Tai E, Mitchell P, Wang JJ, Tay WT, Lamaureux E. C-reactive protein, body mass index, and diabetic retinopathy. Investigative Ophthalmology and Visual Science. 2010; 51(9):4458–4463.
18. 18. Karma L B, Neiwete L, Sonam C B Prevalence Of Diabetic Retinopathy in Type 2 Diabetic Patients Attending Tertiary Care Hospital In Sikkim .DJO 2017;28:19-21
19. 19.Jun L, Xuhong H, Lei Z, Fusong J, Cheng H,Yugian B et al.Association between body mass index and diabetic retinopathy in Chinese patients with type 2 diabetes.Acta Diabetologica:August 2015, Volume 52 ,Issue 4,701-708.
20. 20.Yue Z, Yuezhi Z, Changyun W. Body mass index and risk of diabetic retinopathy A meta-analysis and systematic review. Medicine (Baltimore). 2017 Jun; 96(22): e6754.
21. 21. Rema M, Premkumar S, Anitha B, Deepa R, Pradeepa R, mohan V. Prevalence of diabetic retinopathy in urban India: The Chennai Urban Rural Epidemiology Study (CURES) eye study,I.Invest Ophthalmol Visc Sci 2005;46:2328-33.

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