

A Clinical Study of Fundus Changes in Diabetic Patients

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ABSTRACT

Introduction: Usually a diabetic patient seeks the advice of ophthalmologist only when the ocular condition is in an advanced stage and it becomes a challenging task for an ophthalmologist to treat the condition and to give satisfactory results. It is therefore essential to examine the fundus of every diabetic patient periodically at a regular intervals to detect early changes. So the present study was done to know the incidence of retinopathy in type - 2 diabetic patients with its onset, severity, sex distribution, early diagnosis and visual prognosis and to analyse the fundus changes of diabetic patients with relation to the duration and other associated risk factor like hypertension, hyperlipidemia, smoking, alcohol.

Material and methods: This study was conducted in 100 patients who attended the OPD of Regional Eye Hospital, From February 2014 To July 2015 and were diagnosed with Diabetes mellitus. Fundus examination was done with indirect ophthalmoscope after dilatation of the pupil.

Results: Diabetic retinopathy changes seen in duration of diabetes about less than 10 years were 22.2%. In diabetics of duration about 11-15 years, the retinopathy changes were seen in 29.2%. In duration more than 16 years, in 64.2% of cases the retinopathy changes were seen. 20 cases were NPDR, 8 cases were PDR, 3 cases were advanced diabetic retinopathy. 20% cases of NPDR were with CSME, 37% cases of PDR were with CSME. The most common cause of diminution of vision were cataract and macular edema.

Conclusion: The risk factors for DR in Male gender are poor glycaemic control with long duration of diabetes, high blood pressure, sedentary life style and unhealthy food preferences.

Keywords: Diabetic Retinopathy, Clinically Significant Macular Edema

INTRODUCTION

Diabetic retinopathy is main cause of vision loss in working age adults.¹ Diabetic macular edema is the vision threatening complication of diabetic retinopathy and represents a significant public health issues. Diabetic retinopathy is a micro angiopathy that exhibits features of both micro vascular occlusion and leakage with characteristic picture in the fundus.² In Diabetic retinopathy vision is decreased because of maculopathy or proliferative complications. It is essential to examine the fundus of every diabetic patient periodically at a regular intervals to detect early changes. The complications mainly intraocular hemorrhage and its sequel, tractional retinal detachment, vitreous hemorrhage, cystoid macular edema, optic neuritis are the causes for ocular and visual morbidity. Diabetic retinopathy remains the number one cause of new individuals who lose the vision, because of delay in detection of Diabetic retinopathy. In many developing countries, the incidence is dramatically increasing.³ In view of this, incidence of retinopathy in type 2 diabetics, role of early diagnosis and treatment in patients who attended REH is studied and analysed.

Aim of the study was to know the incidence of retinopathy in type - 2 diabetic patients above 35 years of age with its onset, severity, sex distribution, early diagnosis and visual prognosis and to analyse the fundus changes of diabetic patients with relation to the duration and other associated risk factor like hypertension, hyperlipidemia, smoking, alcohol.

MATERIAL AND METHODS

This study was conducted in 100 patients who attended the OPD of Regional Eye Hospital, From June 2014 To July 2015 and were diagnosed with Diabetes mellitus. Total of 100 Patients were examined and taken into the study. All the patients were above 35 years of age. Patients who fulfilled the inclusion exclusion criteria were taken into the study. All the patients were examined with dilated pupil and fundus examination was done with indirect ophthalmoscopy. Informed consent was taken from all the patients before the start of study.

Inclusion Criteria

Patients above 35 years of age.
Who gave consent for the study.
Confirmed case of Diabetes mellitus.

Exclusion criteria

Those with advanced cataracts or otherwise where the retina cannot be visualized.

STATISTICAL ANALYSIS

Microsoft office 2007 was used to make tables. Results of the study are based on descriptive statistics. Mean and percentages were calculated to infer the data.

RESULTS

The male to female ratio in this study was 1.6:1. Men were at higher risk having retinopathy changes. Majority of them fall in the middle age group (40-60years) (Table-1). 48% were without

S. No	Age	Number of cases examined	Percentagae
1.	35-40 years	12	12%
2.	41-50 years	26	26%
3.	51-60 years	30	30%
4.	61-70 years	24	24%
5.	70 and Above	08	08%

Table-1: Age distribution

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Duration of diabetes	Number of cases examined	With out diabetic retinopathy	NPDR	PDR	Advanced DR	Percentage
< 10years	45	35	8	1	1	22.2%
11-15years	41	29	6	5	1	29.2%
16years and more	14	05	6	2	1	64.2%

Table-2: Severity of diabetic retinopathy

Fundus changes in dr	Mild NPDR	Moderate NPDR	Severe NPDR	PDR	Advanced DR
No. of cases	08	06	06	08	03

Table-3: Fundus changes

S. No.	Other risk Factors	Males	Females	Percentage
1.	Hypertension	29	08	37%
2.	Smoking	25	-	25%
3.	Alcohol	28	-	28%
4.	Obesity	22	06	28%
5.	High lipid profile	30	06	36%
6.	Nephropathy	03	-	03%
7.	Anemia	-	04	04%

Table-4: Diabetic retiopathy associated with other risk factors

family history of diabetes and 52% were with family history of diabetes. Diabetic retinopathy changes seen in duration of diabetes about less than 10 years were 22.2%. In diabetics of duration about 11-15 years of duration the retinopathy changes were seen in 29.2%. In duration more than 16years, 64.2% of cases the retinopathy changes were seen. 20 cases were of NPDR, 8 cases were of PDR and 3 cases were with advanced diabetic retinopathy (Table-2). 20% cases of NPDR were with CSME and 37% cases of PDR were with CSME. The most common cause of diminution of vision were cataract and macular edema. Table-3 shows fundus changes in patients. Of the total cased, 37% of cases had hypertension, 36% of cases had hyperlipidemia, 28% of cases were addicted to alcohol and obese, 25% of cases were smokers, 4% of cases had nephropathy and 3% cases had anaemia as risk factors. Among 100 cases, 77 cases were taking regular treatment (77%) and 23 cases were on irregular treatment (23%) (Table-4). The incidence of diabetic retinopathy was more in patients taking irregular treatment.

DISCUSSION

This was a observational study conducted in 100 patients who attended the OPD of Regional Eye Hospital, from February 2014 to July 2015 and were diagnosed with diabetic mellitus. Among 100 Patients, 69 cases showed no evidence of diabetic retinopathy. 20% showed non proliferative diabetic retinopathy changes, 08% cases showed proliferative diabetic retinopathy changes and 03% cases showed advanced diabetic retinopathy changes. According to Mohan et al⁴ patients suffering from NIDDM of 25years duration, DR was detected in 52% of patients. Non proliferative diabetic retinopathy was seen 41.7% and PDR in 10.3% of patients. In a clinic population of a cohort of 6792, the prevalence of DR was 34.1 % which included NPDR 30.5 % PDR 3.4% and DME 6.4% in type 2 diabetic patients attending a diabetes centre at Chennai in south India. In the present study 36% of cases had history of hyperlipidemia. According to study done by yanko et al.⁵ it is found that the prevalence of retinopathy 11-13 years after the onset of type 2 diabetes was 23%; after 16years or more years, it was 60 %.

Klein et al⁶ reported 67% of patients had retinopathy and 10% had PDR after 10years of diagnosis of type 2 diabetes.

Diabetic retinopathy (DR) is a Microvascular disease of Retina affecting 4 percent of the world's population, DR has been shown to be the cause of visual impairment in 86 percent of type 1 diabetic patients and in 33 per cent of type 2 diabetics In India. However this morbidity is largely preventable and treatable. If managed with timely intervention, the quality of life can be preserved. Almost half of whom have some degree of DR at any given time in 4 percent of the world's population. DR occurs in all type 1 and 75 per cent of type 2 diabetes after 15 year of duration.^{7,8} However, due to the large number of diabetic type 2 subjects, DR is likely to have a public health problem in India. In India Occurrence of DM as Epidemic in type 2diabetes mellitus as reported by the World Health Organization (WHO)⁹, diabetic retinopathy is fast becoming an important cause of visual disability. DR is preventable and treatable if managed early and timely intervention is done.

A female to male ratio in this study was 1:1.6., i.e., among 100 patients 62 were males, 38 were females. Diabetic retinopathy was seen more in males because of more risk factors and precipitating factors like sedentary life style, obesity, alcohol, smoking and others etc. In a study by Mohan Rema et al¹⁰, the male to female ratio was 3: 2. A study conducted by Rema M and Pradeepa R, too showed a preponderance in men with a female to male ratio of 1:2. Study by khandekar et al¹¹ too showed that men are at higher risk of developing retinopathy. Majority of the cases i.e., 30 cases belong to 51-60 years of age group (30%), 26 cases belong to 41-50 years of age group (26%), 24 cases belong to 61-70 years of age group (24%), 12 cases belong to 35-40 years of age group (12%), 8 cases belong to 70 and above age group (8%). Majority of them fall in the middle age group (40-60years). Since these subjects are professionally and functionally more responsible, increased incidence in this age group is not good for society and country, as visual disability leads to economic loss and more burden upon the society. Therefore prevention of diabetes by changing life style, modifying the risk factors and early diagnosis and treatment of diabetic retinopathy is essential in order to preserve working resources of the society. In a study by R Khandekar et al¹¹ showed that the retinopathy rate was higher in age group 50-59 and 60-69 years.

Among 100 cases, 48 (48%) were without family history of diabetics, 52 (52%) were with family history. In this study it showed that the family history is not that significant. This might be due to the recent changes in the life style. The role of genetic factors in relation to retinopathy has been studied, as some patients develop DR irrespective of good glycaemic control.^{12,13} In type 2 diabetes mellitus a study conducted in families of

322 patients, Rema et al¹² reported, a familial clustering of diabetic retinopathy among siblings of diabetic probands with and without DR was present. The odds ratio was 3.5 suggesting that siblings of the probands with DR had 3.5 times higher risk of developing retinopathy. It has also been demonstrated that in Mexican-American type 2 Diabetes.¹³ In the present study, 37% of cases had history of hypertension, (29 male patients, 08 female patients). Increased blood pressure implicated to damage the retinal capillary endothelial cells in eyes with diabetes.¹⁴ The possible mechanisms by which hypertension may affect DR are haemodynamic (impaired autoregulation and hyperperfusion) and through VEGF (vascular endothelial growth factor). One of the study by kornerup concluded that the raise of blood pressure was by no means an essential factor in the etiology of diabetic retinopathy. However, it is reported that retinopathy progresses more rapidly in patients with hypertension than those without it. According toraman et al in study of risk factors diabetic retinopathy in rural India showed that systolic hypertension is a risk for developing diabetic retinopathy. The UKPDS showed that the incidence of retinopathy was associated with systolic blood pressure.¹⁵

In the present study 36% of cases have history of hyperlipidemia (30 male patients 06 females). Individuals with increased total serum cholesterol, low-density lipoprotein (LDL) cholesterol or triglyceride levels are more likely to develop retinal hard exudates, with risk of vision loss, irrespective of the extent of macular edema.¹⁶ Rema et al,¹⁷ The ETDRS¹⁸ and the WESDR¹⁹ found in DR a significant association between elevated serum total cholesterol and LDL cholesterol and the severity of retinal hard exudation. A recent paper from the CURES²⁰ eye study showed an association of DR with total cholesterol and serum triglycerides

In the present study 28% male patients had the history of alcohol intake. Young et al.²¹ reported heavy alcohol consumption to be a risk factor for development of DR in patients without retinopathy at baseline. The Casteldaccia Eye Study demonstrated that duration of alcohol intake was associated with DR.²²

In the present study 22 male, 06 female patients were obese. The diabetes control and complications trial (DCCT) observed in Zhang et al²³ study, that BMI had a significant predictive value.

In the present study 04 females were anemic. In the ETDRS²⁴ for development of high risk PDR and visual impairment, low hematocrit was an independent risk factor.

The common causes of diminution of vision in diabetic retinopathy are cataract, moderate NPDR, PDR with CSME, macular edema, vitreous hemorrhage, retinal detachment. Most common causes of diminution of vision in this study were cataract and macular edema. The Palakkad Eye Disease Survey reported in diabetics, cataract (27.8%) was the leading cause for visual disability.

Among 100 cases, 77 cases were taking regular treatment (77%) and 23 cases were on irregular treatment (23%). Patients on irregular treatment were more prone to the diabetic retinopathy changes and severity of the retinopathy changes. According to study by United kingdom prospective diabetes study, intensive control of diabetes and blood pressure slowed the progression of diabetic retinopathy and reduced the risk of other microvascular complications of DR.

CONCLUSION

The intensive control of hyperglycaemia and hypertension reduces the incidence and progression of diabetic retinopathy. Despite of knowing this many people are unable to maintain these things with in normal limits. Visual disability from DR is largely preventable if managed with prevention of unhealthy food preferences, good glycaemia control, regular screening of retinal examination for early detection of retinopathy changes and timely intervention by laser. DR has become another common cause of visual dysfunction among the middle age group (40-60years) along with senile cataract and glaucoma. So early diagnosis and meticulous management is essential to prevent visual disability and diabetic retinopathy complications.

REFERENCES

1. Manavat MR, Afkhami M, Shoja MR. Retinopathy and microalbuminuria in type II diabetic patients. BMC Ophthalmology. 2004;4:9.
2. Deepa M, Pradeepa R, Rema.M Mohan, Anjana, Deepa R, Shanthirani S, Mohan. The Chennai Urban Rural Epidemiology study. J.Association of Physicians of India. 2004;51:863-870.
3. Efraim Berco, Daniel Rappoport, Ayala Pollack, Guy Kleinmann and Yoel Greenwald (2015). Management of Diabetic Retinopathy and Other Ocular Complications in Type 1 Diabetes, Major Topics in Type 1 Diabetes, Dr. Kenia Nunes (Ed.), InTech, DOI: 10.5772/61276. Available from: <http://www.intechopen.com/books/major-topics-in-type-1-diabetes/management-of-diabetic-retinopathy-and-other-ocular-complications-in-type-1-diabetes>
4. Mohan V et al. Urban rural differences in prevalence of self-reported diabetes in India: The WHO-ICMR Indian NCD risk factor surveillance. Diabetes Res Clin Pract. 2008; 80:159–68.
5. Yanko L, Goldbourt U, Michaelson C, et al. Prevalence and 15-year incidence of retinopathy and associated characteristics in middle-aged and elderly diabetic men. Br J Ophthalmol. 1983;67:759–65.
6. Klein R, Klein B, Moss S, et al. The Wisconsin epidemiologic study of diabetic retinopathy. XIV. Ten-year incidence and progression of diabetic retinopathy. Arch Ophthalmol. 1994;112:1217–28.
7. Klein R, Klein BE, Moss SE, DavisMD, DeMetsDL. The Wisconsin Epidemiologic Study of Diabetic Retinopathy. II. Prevalence and risk of diabetic retinopathywhen age at diagnosis is less than 30 years. Arch Ophthalmol. 1984;102:520–6.
8. Klein R, Klein BEK, Moss SE, Davis MD, DeMets DL. The Wisconsin epidemiologic study of diabetic retinopathy III. Prevalence and risk of diabetic retinopathywhen age at diagnosis is 30 or more years. Arch Ophthalmol. 1984;102:527-32.
9. 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.
10. Deepa M, Pradeepa.R, Rema.M, Mohan, Anjana, Deepa R, Shanthirani. S, Mohan. V. The Chennai Urban Rural Epidemiology Study. J.Association of Physicians of India. 51:863-870.
11. R Khandekar et al. Diabetic retinopathy in Oman: a hospital based study. Br J Ophthalmol. 2003;87:1061-1064
12. Rema M, Saravanan G, Deepa R. Familial clustering of diabetic retinopathy in South Indian Type 2

- diabeticpatients. *Diabet Med.* 2002;19:910-6.
- 13. Hallman DM, Huber JC Jr, Gonzalez VH, Klein BE, KleinR, Hanis CL. Familial aggregation of severity of diabetic retinopathy in Mexican Americans from Starr CountyTexas. *Diabetes Care.* 2005;28:1163-8.
 - 14. Kohner M. Diabetic retinopathy.*Br Med Bull.* 1989;45:148-73.
 - 15. Kostraba JN, Klein R, Dorman JS, Becker DJ, Drash AL, Maser RE, et al. The Epidemiology of Diabetes Complications Study. IV. Correlates of diabetic background and proliferative retinopathy. *Am J Epidemiol.* 1991;133:381-91.
 - 16. Chew EY, Klein ML, Ferris FL III, Remaley NA, Murphy RF, Chantry K, et al. Association of elevated serum lipidlevels with retinal hard exudates in diabetic retinopathy.Early Treatment Diabetic Retinopathy Study (ETDRS) report 22. *Arch Ophthalmol.* 1996;114:1079-84.
 - 17. Mohan R, Mohan V, Susheela L, Ramachandran A, Viswanathan M, et al. Increased LDL cholesterol in noninsulindependent diabetes with maculopathy. *Acta Diabetol Lat.* 1984;21:85-9.
 - 18. Ferris FL 3rd, ChewKY, Hoogwerf BJ. Serum lipids and diabetic retinopathy. Early Treatment Diabetic Retinopathy Study Research Group. *Diabetes Care.* 1996;19:1291-3.
 - 19. Klein BEK, Moss SE, Klein R, Surawicz TS. The Wisconsin Epidemiologic Study of Diabetic Retinopathy, XIII: relationship between serum cholesterol to retinopathy andhard exudate. *Ophthalmology.* 1991;98:1261-5.
 - 20. Rema M, Srivastava BK, Anitha B, Deepa R, Mohan V.Association of serum lipids with diabetic retinopathy inurban south Indians - The Chennai Urban RuralEpidemiology Study (CURES) Eye Study-2. *Diab Med.* 2005;23:1029-36.
 - 21. Young RJ, McCulloch DK, Prescott RJ, Clarke BF. Alcohol:another risk factor for diabetic retinopathy? *Br Med J (ClinRes Ed).* 1984;288:1035-7.
 - 22. Giuffre G, Lodato G, Dardanoni G. Prevalence and riskfactors of diabetic retinopathy in adult and elderly subjects:TheCasteldaccia Eye Study. *Graefes Arch Clin Exp Ophthalmol.* 2004;242:535-40.
 - 23. Zhang L, Krentowski G, Albert A, Lefebvre PJ. Risk ofdeveloping retinopathy in Diabetes Control andComplications Trial type 1 diabetic patients with good orpoor metabolic control. *Diabetes Care.* 2001;24:1275-9.
 - 24. Davis MD, Fisher MR, Gangnon RE, Barton F, Aiello LM, Chew EY, et al. Risk factors for high-risk proliferative diabetic retinopathy and severe visual loss: Early Treatment Diabetic Retinopathy Study Report #18. *Invest OphthalmolVis Sci.* 1998;39:233-52.

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