ORIGINAL RESEARCH PAPER

Ophthalmology

"OCULAR MANIFESTATIONS OF DIABETES MELLITUS IN RELATION TO THE DURATION OF DIABETES AND GLYCAEMIC CONTROL – A STUDY AT A TERTIARY HEALTH CARE CENTRE"

Dr Vishnu Devaraj*	Senior Resident, AGMC and GBP Hospital.*Corresponding Author
Dr Phani Kumar Sarkar	Professor, AGMC and GBP Hospital.
Dr Shivam Gupta	Senior Resident AGMC and GBP Hospital.
Dr Dipanjali Majumder	Senior Resident, AGMC and GBP Hospital.

ABSTRACT

BackGround: Diabetes mellitus results in considerable morbidity and mortality, affecting about 180 million people worldwide. The primary complications of diabetes due to damage in small blood vessels include damage to the eyes, kidneys, and nerves. Damage to the eyes, known as diabetic retinopathy, is caused by damage to the blood vessels in the retina of the eye, and can result in gradual vision loss and eventual blindness. Usually, a diabetic patient seeks the advice of ophthalmologist only when the ocular condition is in the advance stage. It is therefore, essential to examine the fundus and anterior segment of eye of every diabetic patient periodically at regular intervals, to detect early cases. This study was done to analyze the relation of duration and glycaemic control of diabetes to ocular manifestations among patients attending AGMC & GBP Hospital.

Materials and Methods: This crossectional study was carried out on patients of Department of Ophthalmology at AGMC & GBP Hospital from October 2017 to April 2019. A total 85 adult subject (both male and females) of all age group were included in this study. Detailed eye examination and blood investigation like blood sugar and HbA1C was done.

Results: The study showed that 26 (30.6%) patients had mild NPDR, 11(12.9%) patients had moderate NPDR, 8(9.4%) patients had severe NPDR, 2(2.4%) patients had PDR and 38(44.7%) patients had normal retina in right eye. 22(25.9%) patients had mild NPDR, 10(11.8%) patients had moderate NPDR, 7(8.2%) patients had severe NPDR, 1(1.2%) patient had PDR and 45(52.9%) patients had no retinopathy left eye.

INTRODUCTION

Diabetes affects various organs and one of the most important is its ocular manifestations. The incidence of detected diabetes in India is rapidly rising and by the time we succeed in preventing the much of a preventable blindness, diabetes is likely to emerge as a leading cause of ocular disease. The most common and most serious complication is diabetic retinopathy. Diabetic retinopathy is the most well known ocular complication of diabetes and the leading cause of blindness among people 20–64 years of age.[1] The prevalence of retinopathy in diabetic patients varies from one region to another, from one type of diabetes to other, with duration of diabetes and with the degree of control. In major clinical trials, tight control of blood glucose and blood pressure has been demonstrated to reduce the risk of retinopathy and associated blindness.[2] This study was done to analyze the relation of duration and glycaemic control of diabetes to ocular manifestations like diabetic retinopathy, anterior segment complications, cataract, age incidence and sex incidence among patients attending AGMC & GBPH.

MATERIAL AND METHODS:

This crossectional study was carried out on patients of Department of Ophthalmology at AGMC & GBP Hospital from October 2017 to April 2019. A total 85 adult subject (both male and females) of all age group were included in this study.

Study Design: Cross sectional study
Study Location: Department of ophthalmology OPD, AGMC & GBP Hospital
Study Duration: One and a half years (from October 2017 –April2019)
Sample size: 85 patients.

Sample size calculation: Over the last 3 years 900 diabetic patients with ocular manifestations attended Ophthalmology OPD, from this prevalence was calculated to be 25% and final sample size was taken as 85 patients by systematic Random sampling.

SAMPLING METHOD:

Systematic random sampling was done. Over a time period of 18 months patient fulfilling the inclusion criteria was selected till the target sample size was achieved.

INCLUSION CRITERIA:

All diabetic patients who attended ophthalmology OPD and retina clinic of AGMC & GBP hospital diagnosed as diabetic for 5years or more.

EXCLUSION CRITERIA:

1. Those patients who have not given consent
2. Non-diabetic patients
3. Gestational diabetes
4. Critically ill diabetic patients
5. Diabetic ketoacidosis
6. Diabetic patients with collagen vascular diseases.
7. Any other ocular disease causing diminution of vision

Procedure methodology

All patients were informed in detail about purpose of study and procedures to be followed and consent was obtained for participation in the study. Patients data including age, sex, place of residence was noted. Distant visual acuity of all patients was assessed using the Snellen's chart/drum and near vision with near vision chart. After that, slit lamp examination of the anterior segment was done. Then pupil was dilated with 1% tropicamide& 0.5% phenylephrine and posterior segment was examined with distant direct ophthalmoscope, 90D lens and indirect ophthalmoscope. USG B scan was carried out in those patients that have hazy media. Applanation tonometry was done to assess the intraocular pressure.

INVESTIGATIONS:

Blood sugar – Fasting & postprandial,.HbA1c,USG B scan, NCT and Applanation tonometry

STATISTICAL ANALYSIS:

For statistical analysis data were entered into a Microsoft excel spreadsheet and then analyzed by SPSS (version 15.0; SPSS Inc., Chicago, IL, USA). Data had been summarized as mean and standard deviation for numerical variables and count and percentages for categorical variables. Two-sample t-tests for a difference in mean involved independent samples or unpaired samples. Paired t-tests were a form of blocking and had greater power than unpaired tests. One-way analysis of variance (one-way ANOVA) was a technique used to compare means of three or more samples for numerical data (using the F distribution). A chi-squared test ($\chi2$ test) was any statistical hypothesis test wherein the sampling distribution of the test statistic is a chi-squared distribution when the null hypothesis is true. Without other qualification, 'chi-squared test' often is used as short for Pearson's chi-squared test. Unpaired proportions were compared by Chi-square test or Fischer's exact test, as appropriate. P-value $\leq$ 0.05 was considered statistically significant.

ETHICAL ISSUE: Informed written consent was obtained from each and every participant as per modified ICMR template. Confidentiality was maintained while collecting and analyzing the data and was used for research purpose only. Application placed before the institutional ethics committee was approved.

RESULT

In our study 6 patients were less than 40 years of age, 26 were 41 to 50 years of age, 29 patients were 51 to 60 years of age, 17 patients were 61 to 70 years of age and 7 patients were 71 to 80 years of age. 31 patients were females and 54 patients were males.
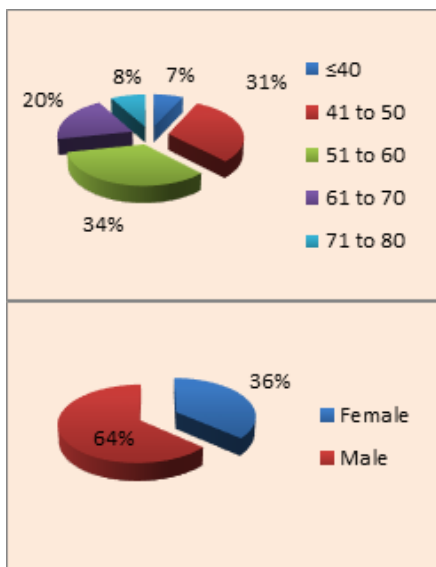

Fig. 1: Pie chart showing age and sex distribution

In our study 34(40.0%) patients who had diabetes for 5 to 10 years duration and constituted the majority, 30 (35.3%) patients had diabetes for 11-15 years, 13 patients (15.3%) for 16-20 years and 8 (9.4%) 21-25 years of duration.
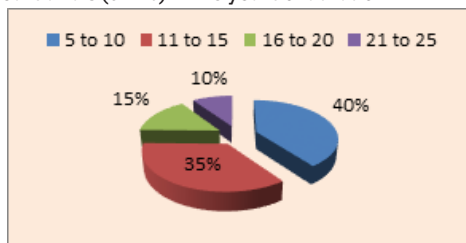

Fig. 2: Pie Chart showing Distribution of Duration of Diabetes in Years

We observed that 26 (30.6%) patients had mild NPDR, 11(12.9%) patients had moderate NPDR, 8(9.4%) patients had severe NPDR, 2(2.4%) patients had PDR and 38(44.7%) patients had normal retina in right eye.

22(25.9%) patients had mild NPDR, 10(11.8%) patients had moderate NPDR, 7(8.2%) patients had severe NPDR, 1(1.2%) patient had PDR and 45(52.9%) patients had no retinopathy left eye.

Table no 1 Shows the status of right eye and left eye according to stage of Diabetic Retinopathy

In our study we observed 2 (2.4%) patients had asteroid hyalosis, 3(3.5%) patients had vitreous hemorrhage but maximum 80(94.1%) patients had no vitreous complications Among patients of duration 5 to 10 years, 10(29.4%) patients had mild NPDR, 2(5.9%) patients had PDR, 3(8.8%) patients had severe NPDR and 19(55.9%) patients had no retinopathy in right eye.

In duration 11 to 15 years, 9(30.0%) patients had mild NPDR, 7(23.3%) patients had moderate NPDR, 2(6.7%) patients had severe NPDR and 12(40.0%) patients had had no retinopathy in right eye.

In duration 16 to 20 years, 4(30.8%) patients had mild NPDR, 2(15.4%) patients had moderate NPDR, 2(15.4%) patients had severe NPDR 5(38.5%) patients had had no retinopathy in right eye.

In duration 21 to 25 years, 3(37.5%) patients had mild NPDR, 2(25.0%) patients had moderate NPDR, 1(12.5%) patient had severe NPDR 2(25.0%) patients had had no retinopathy in right eye.

Association of diabetic retinopathy in right eye with duration was statistically significant (p=0.003176).

Table 2: Association of Diabetic Retinopathy and Duration

Diabetes status RE	Duration in Years							
	5 to 10		11 to 15		16 to 20		21 to 25	
	RE	LE	RE	LE	RE	LE	RE	LE
MILD NPDR	10	8	9	9	4	2	3	3
MOD NPDR	0	0	7	6	2	2	2	2
PDR	2	2	0	2	0	2	0	1
SEVERE NPDR	3	1	2	0	2	0	1	0
Normal	19	23	12	13	5	7	2	2
TOTAL	34	34	30	30	13	13	8	8

Among patients of duration 5 to 10 years, 1 (2.9%) patient had asteroid hyalosis, and 1(2.9%) patient had vitreous hemorrhage. In duration 11 to 15 years no vitreous complications. In duration 16 to 20 years, 2(15.4%) patients had vitreous hemorrhage. In duration 21 to 25 years, 1(12.5%) patient had asteroid hyalosis. Association of vitreous complications with duration was not statistically significant (p=0.0772).

Table 4: Association of Vitreous Complications and Duration

VITREOUS COMPLICATIONS	Duration in Years				
	5 to 10	11 to 15	16 to 20	21 to 25	TOTAL
ASTEROID HYALOSIS	1	0	0	1	2
NORMAL	32	30	11	7	80
VITREOUS HEMORRHAGE	1	0	2	0	3
TOTAL	34	30	13	8	85

Distribution of mean PPBS , HbA1C, Diabetic Retinopathy changes and vitreous complications

Years	No.	Mean PPBS	Mean FBS	HbA1c	No. with D R	Vitreous Complications	
					Right Eye	Left Eye	
5 to 10	34	171	136.	7.1	15	11	2
11 to 15	30	183	134	7.3	18	17	0
16 to 20	13	171	145	8.6	8	6	2
21 to 25	8	177	120	7.2	6	6	1

with Respect to Duration

In the present study, incidence of cataract was found to be 51% in right eye and 55 % in left eye of total 85 patients having diabetes.

LENS STATUS	RIGHT EYE	LEFT EYE
NS1	3	4
NS2	4	3
NS3	10	12
NS4	4	2
PSC	23	26
PSEUDOPHAKIA	14	11
CLEAR	27	27

(NS: Nuclear Sclerosis, PSC: Posterior Sub-capsular Cataract)

DISCUSSION

85 patients diagnosed with diabetes who attended this tertiary care center were enrolled in this study as per selection criteria. Age of presentation of patients ranged from 10 years to 80 years. Maximum numbers of patient were in age group of 41-60.

In this study, the 40 % of the total patients had diabetes in the range of 5-10year duration followed by 35 % belonging to 11-15 years duration. Mild NPDR was more among the patients of duration 5-10 years. As the duration of diabetes increased the HBA1c levels were also increasing. Klein R et al showed persons with diabetes of 10 years duration or less, the Cox regression model relates the severity of retinopathy to longer duration, older age at examination, and higher levels of glycosylated haemoglobin [3]. Bansal P et al found that the correlation between diabetic retinopathy (DR) and duration of diabetes mellitus [4]. A cross-sectional study was carried out in 500 patients. Among these, non-proliferative diabetic retinopathy (NPDR) is seen in 71.88% and proliferative diabetic retinopathy (PDR) in 28.12% patients. This study showed an increasing prevalence of DR with increasing duration of DM. The prevalence of DR was seen to be 9.44% when duration of diabetes detected was less than 5 years and was 76.47% in patients with diabetes of more than 20 to 25 years. There is an increasing prevalence of DR with increase in duration of DM. All patients having diabetes of more than 25 years were found to have retinopathy.

In our study, most of the patients had mild NPDR, 26 patients had mild NPDR in right eye which constituted 30 % and 22 patients had mild NPDR in left eye. Patients having diabetes for duration 11 to 15 years constituted the majority. Association of diabetic retinopathy with duration was statistically significant (p value=0.002). These findings were concurring with findings of Bansal P et al [4] and Raja Kumar p et al [5]. Bansal P et al [4] showed an increasing prevalence of DR with increasing duration of DM. The prevalence of DR was seen to be 9.44% when duration of diabetes detected was less than 5 years and was 76.47% in patients with diabetes of more than 20 to 25 years.

Among the total 85 patients there were 3 patients who suffered from PDR. This constituted the 3.6 % of the total study population. Huri HZ et al [6] showed in a study among 104 patients aged 40-84 years, 6 patients (5%) had proliferative diabetic retinopathy (PDR).

In the present study, the main vitreous complication was vitreous haemorrhage, followed by asteroid hyalosis. 2(2.4%) patients had asteroid hyalosis, 3(3.5%) patients had vitreous hemorrhage and 80(94.1%) patients had no vitreous complications. Association of duration of diabetes with vitreous complication however was not statistically significant. The study results were though comparable to the study by Raja Kumar et al [7]which showed vitreous haemorrhage as 6% and asteroid hyalosis 1%.

Present study showed mean HBA1C of patients was 7.4544 ± 1.1579 which was statistically significant. The findings in our study were concurring with the study by Nath JD et al [7] and Rajeha BS et al [8]. The mean HBA1C and duration of diabetes was statistically significant (p=0.0008).

In the present study, incidence of cataract was found to be 51% in right eye and 55 % in left eye of total 85 patients having diabetes. The highest incidence of cataract was found in the 51-60 years age group and mean age of cataract presentation was 50.06 +5years. These findings concurred well with study by Raja Kumar P et al in which most of the patients were found to be in the age group of 50-59 years (32%). [9]

CONCLUSION

Prevalence of diabetic retinopathy is higher in patients with longer duration of diabetes. There is significant correlation between the HbA1c and diabetic retinopathy. Vitreous hemorrhage is the main vitreous complication.

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