

Original Article

A Study on Ocular Manifestations of Diabetes Mellitus

Alok Kathiara*, Ravija Patel*, Hasmukh Ahir**

* Resident, **Asst Professor. Dept. of ophthalmology, S.S.G. Hospital & Medical College, Vadodara, Gujarat

DOI: 10.5455/jrmds.20153211

ABSTRACT

Background: 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. A large bulk of literature is available describing retinopathy in its various aspects; but the other ocular manifestations of diabetes have been scantily written upon and so their epidemiology is even less well known.

Aims: The objective of the study is to find out the incidence of different ocular manifestations of diabetes mellitus. The study is also done to determine the relationship of various risk factors and systemic diseases associated with diabetes mellitus and suggest the measures to prevent various sight threatening complications of diabetes mellitus.

Material and Methods: The ocular manifestations were studied in 60 patients attending the eye OPD and the Diabetic Clinic of S. S. G. Hospital, Baroda during a period of 12 months.

Results: Cataract was found to be the most common ocular manifestation of diabetes mellitus-35 patients (58.33%). The second most common manifestation was diabetic retinopathy-25 patients (41.66%). Also the most common associated systemic disease was found to be hypertension-20 patients (33.3%).

Conclusion: Cataract and retinopathy were the two most common manifestations of diabetes mellitus. Patients having cataract can be very well managed by advanced cataract extraction techniques but to diagnose the early changes of retinopathy is of prime importance. A thorough ocular examination of patients having diabetes is a must, including both anterior and posterior segment examination.

Key words: Diabetes Mellitus, Cataract, Diabetic Retinopathy

INTRODUCTION

Diabetes affects various organs and of these perhaps 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. In the light of this, much work remains to be done in India, first to understand all the aspects of the problem as it applies to us and then to find the ways and means of effectively countering the handicaps. Diabetes affects the eye in various ways. The advent of insulin has increased the longevity of diabetics and hence the rate of complications has risen. 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 in the U.S. [1]. The prevalence of retinopathy in diabetic patients varies from one region to another, from one type of diabetes to

another, with duration of diabetes, with the degree of control and most significantly from one study to another. 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]. The objective of the article is to study the incidence of different ocular manifestations of diabetes mellitus in patients attending S.S.G. Hospital, Baroda. The study is also done to determine the relationship of various risk factors and systemic diseases associated with diabetes mellitus and suggest the measures to prevent various sight threatening complications of diabetes mellitus.

MATERIAL AND METHODS

The subjects of the study were picked up from the diabetic clinic and patients attending Out Patient Department (OPD) of Ophthalmology of S.S.G. Hospital, Baroda. The S.S.G. Hospital is the largest hospital in the region and caters to the populace of four districts: Vadodara, Bharuch, Kheda and

Panchmahals. It thus has a rich area as far as patient drainage is concerned. The Diabetic Clinic is attached to the Department of Medicine and runs biweekly. The patients attending the clinic come from all strata of society. They are proven to be diabetics in form of fasting and two hour postprandial blood sugar levels. Sixty of these proven diabetes patients were studied in detail, for ocular manifestations, selected by random sampling over a period of one year in 2005-2006. Each patient was examined once.

Patient's basic information was noted first, which includes name, age, sex, reg. no, occupation etc. patient's postal address was also noted in detail in order to call them again in future for follow up if required. The prior written informed consent and ethics committee approval was taken.

Patient's chief ocular complaints were also noted especially of dimness of vision, floaters, flashes, ocular pain, metamorphopsia etc. Patient's complains related to diabetes and other systemic diseases were also asked.

A brief history about diabetes was asked in the form of type of diabetes, duration of diabetes and the present treatment for diabetes. Treatment history of other associated systemic disease was also noted. The diabetic age as calculated from the time of diagnosis, obviously need not accurately represent the true duration of diabetes, particularly in type 2 diabetics. Specific significant positive family history for diabetes was also asked and patient's personal history was noted.

Patient's past history regarding other systemic disease and hospitalisation was also asked and brief systemic examination was done. The visual acuity was tested by snellen's chart. In cases required, retinoscopy was done with undilated and dilated pupils. Also, patients were given subjective correction whenever possible, both for distant and near vision.

The intraocular tension was measured with a Schiotz tonometer. The tension was taken prior to dilatation of pupils.

Sac syringing of both the eyes were done to rule out any case of dacryocystitis. Colour vision was tested by the pseudo-isochromatic Ishihara charts. It was tested monocularly first and then binocularly. Each eye was examined in detail with the help of a torch light. Abnormalities were noted. The findings of torch light examination were confirmed on slit lamp biomicroscope and other abnormalities were also noted from slit lamp examination.

The fundus examination was done by dilating the pupil with phenylephrine 10% eye drops or Homatropine 2% (as required) and examining by direct and indirect ophthalmoscopes. The media, disc, vessels, macula, periphery were examined and the findings noted. And the retinopathy was classified as background and proliferative retinopathy according to the findings present. The central 30 degree visual field examination was carried out wherever possible.

The basic investigations were performed and noted, like FBS, PP2BS, HB1AC, urine examination, complete blood count etc. All the data regarding the patient was taken according to Proforma, which is given at the end of the study.

RESULTS AND DISCUSSION

This was a prospective study of 60 diabetic patients attending eye OPD and diabetic clinic of S.S.G. Hospital, Baroda over a period of 12 months.

Of the sixty patients in the study, 34 (56.6%) were males and 26 (43.3%) were females as shown in table 1. Out of these sixty patients, the majority of the patients were belonging to the age group of 46-60 years. 46 patients were above the age of 45 years (76.6%). This signifies that, diabetes is more common in older age group. In terms of age and sex distribution, the sample of patients that were studied is comparable to the general population of the detected diabetics in India. The youngest patient the study was 12 years old and the oldest was 70 years old. And the mean age in this study was 52.28 +/- 14.75 years. Most studies have shown no sex difference in the prevalence of diabetes but in this study, there was a slight preponderance in males. Among them 34 of them being males and the rest 26 females.

Table 1: Distribution of patients by age and sex

Age group (in yrs)	Male (N=34)	Female (N=26)	Total (N=60)
0-15	1(1.66)	0(0)	1(1.66)
16-30	6(10)	1(1.66)	7(11.66)
31-45	2(3.33)	4(6.66)	6(10)
46-60	15(25)	11(18.33)	26(43.33)
>61	10(16.66)	10(16.66)	20(33.33)

(Figures in parenthesis are percentages)

Going by the age at detection of DM, it is evident in the study that majority of the patients were more than the age of 45 years at detection of DM (61.6%) as shown in table 2.

Table 2: Distribution of patients by age at detection and sex

Age group (in yrs)	Male (N=34)	Female (N=26)	Total (N=60)
0-15	2 (3.33)	1(1.66)	3(5)
16-30	5(8.33)	2(3.33)	7(11.66)
31-45	8(13.33)	5(8.33)	13(21.66)
46-60	16(26.66)	15(25)	31(51.66)
>61	3(5)	3(5)	6(10)

(Figures in parenthesis are percentages)

Table 3: Distribution of type of diabetes according to sex

Type of DM	Male (N=34)	Female (N=26)	Total (N=60)
Type 1 DM	7(11.66)	1(1.66)	8(13.33)
Type 2 DM	27(45)	25(41.66)	52(86.66)

(Figures in parenthesis are percentages)

The patients were classified according to type 1 and type 2 (IDDM and NIDDM respectively). Type 1 diabetics constitute 13.3% (8 patients) of the sample, whereas type 2 diabetics constitute 86.6% (52 patients) of the sample as shown in table 3. The prevalence of type 2 diabetes was found to be nearly equal in both males and females (27 and 25 respectively). The prevalence of type 1 diabetic was found to be high in male category (7 male patients and 1 female patient). This difference can be attributed to less awareness of parents for female child, especially in low socio economic sections of the society.

All type 1 diabetics were detected before the age of 45 years and among type 2 diabetics, most of them 71.15% (37 patients) were detected after the age of 45 years. This also shows the higher prevalence of diabetes among older age group especially type 2 diabetes. The average age at detection for males and females was roughly the same, male being detected proportionately slightly earlier. It signifies more awareness among males among diabetics in general population.

The most common ocular finding among diabetics was found to be cataract- 58.33% (35 patients) as shown in table 4. Numerous studies have documented an association between diabetes and cataracts. This association is supported by an abundance of data from clinical epidemiological studies and basic science studies [3, 4]. However all these patients having cataract cannot be attributed to diabetes only. Some of them might be having pure senile cataract. There is additional evidence that the risk of cataract increases with

increasing diabetes duration and severity of hyperglycemia [5]. Deposition of advanced glycation end products in the lens has been postulated as one possible pathogenic mechanism for diabetic cataract [6].

Table 4: List of ocular findings by sex

Ocular Manifestation	Male	Female	Total
Stye	0(0)	0(0)	0(0)
Chalazion	1(1.66)	0(0)	1(1.66)
Blepharitis	1(1.66)	0(0)	1(1.66)
Ptosis	1(1.66)	1(1.66)	2(3.33)
Corneal Ulcer	3(5)	0(0)	3(5)
Viral keratitis	2(3.33)	0(0)	2(3.33)
Iridocyclitis	0(0)	3(5)	3(5)
Rubeosis iridis	1(1.66)	0(0)	1(1.66)
Hyphaema	0(0)	1(1.66)	1(1.66)
Cataract	16(26.66)	19(31.66)	35(58.33)
1. Immature	16(26.66)	14(23.33)	30(50)
2. Mature	0(0)	4(6.66)	4(6.66)
3. Complicated	0(0)	1(1.66)	1(1.66)
Vitreous hemorrhage	1(1.66)	0(0)	1(1.66)
Asteroid Hyalosis	1(1.66)	0(0)	1(1.66)
Vitreous Floaters	3(5)	1(1.66)	4(6.66)
Fibrovascular bands	1(1.66)	2(3.33)	3(5)
Diabetic Retinopathy	14(23.33)	11(18.33)	25(41.66)
1. Background	9(15)	8(13.33)	17(28.33)
2. Pre-proliferative	1(1.66)	0(0)	1(1.66)
3. Proliferative	4(6.66)	3(5)	7(1.66)
Lipemia Retinalis	0(0)	0(0)	0(0)
Retinal Detachment	1(1.66)	0(0)	1(1.66)
Xanthoma Retinalis	0(0)	0(0)	0(0)
Extra ocular muscle palsy	0(0)	0(0)	0(0)
Optic Neuritis	0(0)	0(0)	0(0)
Optic Atrophy	0(0)	0(0)	0(0)
Hypotony	0(0)	0(0)	0(0)
Glaucoma	1(1.66)	2(3.33)	3(5)

(Figures in parenthesis are percentages)

Among the patients having cataract, it is difficult to say, what proportion of them were diabetic in aetiology. However, in these senile types of cataracts, it was found that, they are present significantly more frequently in diabetes of longer

duration. Also they were apparently more prevalent in females than in males.

In a study by Perkins et al. showed that more females than males were admitted for cataract extraction [7]. About 13.7% of the patients were diabetic and there was striking excess of females over males with diabetes and cataract.

The second most common manifestation after cataract was found to be diabetic retinopathy - 41.66% (25 patients). But if we exclude some of the cataract, assuming them to be of pure senile variety, then retinopathy can be termed as the most common ocular manifestation of diabetes mellitus. Patients with type 1 diabetes may show evidence of retinopathy as early as 5 years after the onset of diabetes, and almost all patients will show varying degrees of retinopathy 20 years after the onset of diabetes.

Relating retinopathy to the age of onset, as shown in table 5, we find that patients detected after the age of 30 years show a consistently high degree of affection (88%). The highest numbers of patients were belonging to age group of 46 to 60 years (56%). It is important to note that, no proliferative retinopathy was detected in younger age groups in this study.

Although specific treatment modalities for retinopathy threatening vision have improved over years of clinical and research experience, importance of preventive measures (tight glycemic and blood pressure (BP) control, smoking cessation, regular eye screening) cannot be underestimated.

Routine comprehensive eye evaluation helps to detect early treatable stages of DR which are frequently asymptomatic. Comprehensive eye examination is recommended within 3 to 5 years of disease onset in type 1 diabetic patients aged 10 years or older and immediately after diagnosis in type 2 diabetes. Diabetic patients without evidence of retinopathy should undergo eye examinations every year to detect its emergence. For patients with moderate-to-severe preproliferative disease, more frequent eye examinations are necessary to determine when to initiate therapy [8].

The most common associated systemic disease was found to be hypertension-20 patients (33.3%). Hypertension is one of the important and modifiable risk factors for the development and/ or worsening of DR. Results of RCTs [9, 10] have demonstrated that hypertension is detrimental to each stage of DR

and a tight BP control strategy can reduce the risk of eye complications from diabetes.

CONCLUSION:

The ocular manifestations were studied in 60 patients attending the eye OPD and the Diabetic Clinic of S. S. G. Hospital, Baroda during a period of 12 months.

Cataract was found to be the most common ocular manifestation of diabetes mellitus-35 patients (58.33%). It was found that, they occur significantly more frequently in diabetes of longer duration. Also they were apparently more prevalent in females than in males. Cataract in patients having diabetes can be very well managed by various advanced modern surgical techniques with good results.

The second most common manifestation was diabetic retinopathy-25 patients (41.66%). It was found that the retinopathy was more common among males (56%) compared to females (44%). It was apparent that the incidence of retinopathy was higher in patients having poor glycemic control. It was also noted from the study that, with increasing diabetic age, there is increased risk of development of various afflictions, especially of diabetic retinopathy. Patients detected after the age of 30 years show a consistently high degree of affection (88%) for the development of retinopathy.

Diabetic retinopathy is potentially blinding disease in patients of diabetes. Once the retinopathy sets in, and it progresses to advanced stages, it is very difficult to cure. The treatment modalities available can only prevent further loss of vision and give somewhat improvement in visual acuity, provided the blood sugar levels are kept under strict control. Early detection, careful follow-up and prompt treatment are key stages in the successful management of diabetic retinopathy.

Effective glycemic control has been demonstrated to reduce both the incidence and progression of DR. In DCCT (The Diabetes Control and Complications Trial), the rate of DR progression in the intensively treated group remained significantly lower than in the conventional group [11].

So, it is imperative that all patients having diabetes mellitus undergo routine ocular evaluation with both anterior and posterior segment examination. It is also very important to evaluate fundus with both slit lamp biomicroscopy and indirect ophthalmoscopy. It is imperative to diagnose these conditions early enough, to reduce the overall ocular morbidity caused by diabetes. It is also very important to closely follow these patients, as various ocular

manifestations may develop at any time during their life span and early diagnosis and treatment are of utmost importance.

Also the most common associated systemic disease was found to be hypertension-20 patients (33.3%). And it was also apparent that hypertension is one of the risk factors for development of other ocular manifestations of diabetes and should be kept under control.

REFERENCES

1. Congdon NG, Friedman DS, Lietman T. Important causes of visual impairment in the world today. *JAMA* 2003;290:2057-60.
2. Mohamed Q, Gillies MC, Wong TY. Management of diabetic retinopathy: a systematic review. *JAMA* 2007;298:902-16.
3. Rowe NG, Mitchell PG, Cumming RG, Wans JJ. Diabetes, fasting blood glucose and age-related cataract: the Blue Mountains Eye Study. *Ophthalmic Epidemiol* 2000;7:103-14.
4. A J Bron, J Sparrow, N A P Brown, J J Harding, R Blakytyn. The lens in diabetes. *Eye* 1993;7:260-75.
5. Negahban K, Chern K. Cataracts associated with systemic disorders and syndromes. *Curr Opin Ophthalmol* 2002;13:419-22.
6. Pirie A. Epidemiological and biochemical studies of cataract and diabetes. *Invest Ophthalmol* 1965;4:629-37.
7. Perkins ES. Cataract: refractive error, diabetes, and morphology. *Br J Ophthalmol* 1984;68(5):293-7.
8. Yam J, Kwok A. Update on the treatment of diabetic retinopathy. *Hong Kong Med J* 2007;13:46-60.
9. Matthews DR, Stratton IM, Aldington SJ, Holman RR, Kohner EM. UK Prospective Diabetes Study Group. Risks of progression of retinopathy and vision loss related to tight blood pressure control in type 2 diabetes mellitus. *Arch Ophthalmol* 2004;122:1631-40.
10. Estacio RO, Jeffers BW, Gifford N, Schrier RW. Effect of blood pressure control on diabetic microvascular complications in patients with hypertension and type 2 diabetes. *Diabetes Care* 2000;23:54-64.
11. Progression of retinopathy with intensive versus conventional treatment in the Diabetes Control and Complications Trial. *Diabetes Control and Complications Trial Research Group. Ophthalmology* 1995;102:647-61.

Corresponding Author:

Dr. Alok Kathiara
B/2, Kanchanjangha Apartments,
C.G. Road, Ahmedabad-380006
Gujarat, India
Email: alok345@gmail.com

Date of Submission: 14/08/2014
Date of Acceptance: 27/06/2015

How to cite this article: Kathiara A, Patel R, Ahir H. A Study on Manifestations of Diabetes Mellitus. *J Res Med Den Sci* 2015;3(2):143-7.

Source of Support: None

Conflict of Interest: None declared