

A Clinical Study of the Ocular Complications of Diabetes Mellitus

Dr Pasupala VasudevAnand¹, Dr Goli Sridhar²

1 Assistant Professor, Department of Ophthalmology, SD Eye Hospital, Osmania Medical College, Hyderabad.

2. Assistant Professor, Department of Ophthalmology, SD Eye Hospital, Gandhi Medical College, Secunderabad.

Corresponding author: Dr Pasupala VasudevAnand

Abstract: Complications of diabetes mellitus (DM) are progressive and lead to several ocular complications such as diabetic retinopathy, diabetic papillopathy, glaucoma, cataract, and ocular surface diseases. There is recent recognition of the potential for diabetes to reach epidemic proportions and the possible implications on visual impairment in India, especially as rural areas in India rapidly “urbanise”. Ocular complications of diabetes manifests in myriad ways, but manifestations of diabetes other than diabetic retinopathy are easily overlooked. A total of 380 patients who have been admitted with various ocular conditions at our institute during January to June 2018 and who are a known case of Type I & Type II Diabetes Mellitus on medical management were included in the study. Patients with Gestational Diabetes and with any other associated comorbid condition (like Hypertension, CAD, CKD, Epilepsy etc.) were excluded from the study group. The demographic details of the study group were recorded. The history of Diabetes with respect to onset, management, family history, frequency of consultation, previous Ophthalmic consultations, awareness of ocular manifestations were documented. Results analysed and discussed.

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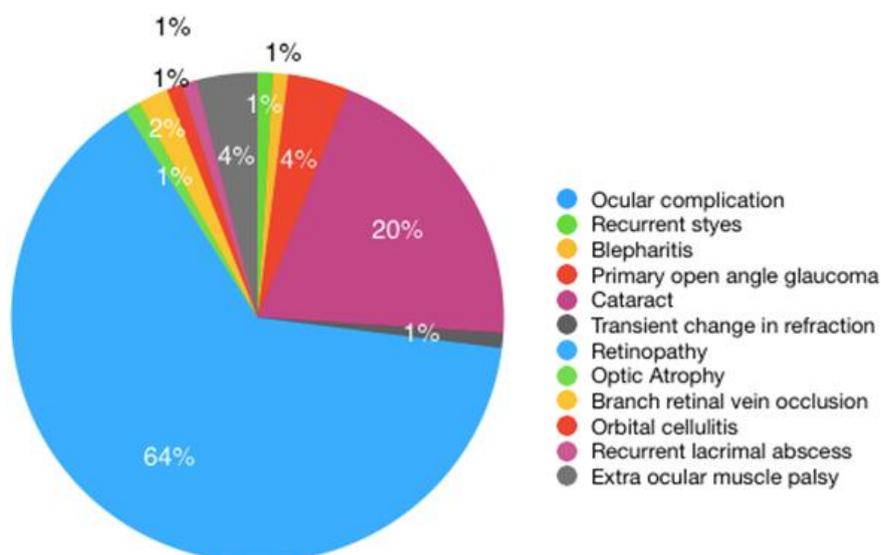
I. Introduction

Complications of diabetes mellitus (DM) are progressive and lead to several ocular complications such as diabetic retinopathy, diabetic papillopathy, glaucoma, cataract, and ocular surface diseases [1]. There is recent recognition of the potential for diabetes to reach epidemic proportions and the possible implications on visual impairment in India, especially as rural areas in India rapidly “urbanise”. Ocular complications of diabetes manifests in myriad ways, but manifestations of diabetes other than diabetic retinopathy are easily overlooked. The estimates of the prevalence of diabetic retinopathy in India suggest there may be nearly 5.6 million people with diabetic retinopathy in India [2]. There may be 2.9 million persons with mild nonproliferative retinopathy, 2.2 million people with moderate nonproliferative retinopathy, 111,258 people with severe nonproliferative retinopathy and 295,688 people with proliferative retinopathy [3]. Briefly, common ocular complications of Diabetes is listed in table 1.

Conjunctiva	Microaneurysms, Venous dilatation.
Cornea	Folds of Descemet's membrane, neurotrophic keratitis.
Iris	Iritis, Iris pigments on lens, Rubeosis Iridis.
Pupil	Rigid pupil, light near dissociation.
Lens	Cataract, refractive errors.
Vitreous	Vitreous haemorrhage, asteroid hyalosis.
Retina	Diabetic retinopathy; retinal vein occlusion, Lipaemia retinalis.
Optic Nerve	Ischemic papillitis; Optic atrophy.
ExtraOcular Muscles	rd th th Palsy caused by 3, 4, 6 cranial nerve involvement.
Orbit	Mucormycosis
IOP	Primary Open angle glaucoma, Neovascular glaucoma
Eyelid	Xanthelasmata, Blepharitis, Recurrent hordeolum, eczema

Table 1 : Brief list of Ocular Complications - Diabetes [4]

The present study aims to determine the common ocular complications of Diabetes Mellitus and its implications with respect to chronicity and age of Diabetic patient.



II. Methodology

A total of 380 patients who have been admitted with various ocular conditions at our institute during January to June 2018 and who are a known case of Type I & Type II Diabetes Mellitus on medical management were included in the study. Patients with Gestational Diabetes and with any other associated comorbid condition (like Hypertension, CAD, CKD, Epilepsy etc.) were excluded from the study group. The demographic details of the study group were recorded. The history of Diabetes with respect to onset, management, family history, frequency of consultation, previous Ophthalmic consultations, awareness of ocular manifestations were documented. Ocular examination included detailed examination of the anterior segment, extra ocular movements were checked 40, corneal sensations were checked using a wisp of sterile cotton, visual acuity assessment and refraction, slit lamp examination, Direct ophthalmoscopy Slit lamp biomicroscopy, Indirect ophthalmoscopy, Visual fields(whenever indicated). Laboratory investigations of fasting and post lunch blood sugars and urine albumin and sugars, Glycosylated Haemoglobin- HbA1C of the study population is done. All the patients who underwent any intervention were followed up regularly.

III. Results

The average age of the study group was 55.3 years (Range : 42-79). In this study most of the patients were found to be in the age group of 51-60 years (38%). The average age of the patients studied was 55.3 yrs. A non significant association was found between age group and ocular complication of diabetes mellitus. There was no significant sex predilection for the association of diabetes to ocular manifestation in the study group. 36 (9.4%) patients had poor compliance of management of Diabetes and at the time of admission were not on treatment. Of the remaining 344, 196 (51.5%) were on insulin and rest 148 (38.9%) were on oral hypoglycaemic drugs. 6.3 % (n=24) of the study group were Juvenile onset Diabetes.

Ocular complication	Number of patients	Percentage
Recurrent styes	4	1
Blepharitis	4	1
Primary open angle glaucoma	15	4
Cataract	76	20
Transient change in refraction	2	0.5
Retinopathy	243	64
Optic Atrophy	4	1
Branch retinal vein occlusion	7	2
Orbital cellulitis	3	1

Ocular complication	Number of patients	Percentage
Recurrent lacrimal abscess	5	1
Extra ocular muscle palsy	3	4

Table 2 : Ocular Complications in the study group.

In the present study we found retinopathy to be the most common ocular complication occurring in diabetes subjects (64%). The prevalence of cataract was 20% followed by Primary open angle glaucoma (4%) and extra ocular muscle palsy(4%). [Table 2 & Fig 1, Fig 2]

A non significant association was noted between the type of diabetes and associated ocular complication in the present study. In our study 26.7% of patients with type 1 diabetes mellitus had NPDR while 54.1% of patients with type 2 diabetes mellitus had NPDR. The prevalence of NPDR was higher in type 2 diabetes subjects, while the prevalence of PDR was higher in subjects with type 1 diabetes (13.3%). We found 5.9% of type 2 diabetes subjects having CSME while none of the subjects with type 1 diabetes had CSME.

In this study we found a significant correlation between duration of diabetes and associated ocular complication. The most notable complications seen with increased duration of diabetes was NPDR - Non Proliferative Diabetic Retinopathy (seen in 61.5% subjects with diabetes for 6-10 year duration). Increased incidence of CSME -Clinically significant Macular Edema was noted as the duration of diabetes increased (5.8% of subjects with diabetes in the duration range of 6-10yrs had CSME while 10.5% of subjects with diabetes in the duration range of >10 years had CSME. we asked the patients as to the regularity of the treatment and found that subjects taking regular treatment(oral tablets/insulin) had lower prevalence of mild NPDR(35.7%), moderate NPDR(45.5%) and severe NPDR(33.1%) when compared to the group not taking treatment regularly. A non significant association was noted between compliance of anti diabetic treatment and severity of NPDR.

In the present study we classified patients into two groups, those with good diabetic control (FBS<126mg/dl) and those with bad diabetic control (FBS>126mg/dl). We noted that patients with good diabetic control had lesser prevalence of mild NPDR (28.6%), moderate NPDR (42.4%) and severe NPDR when compared with subjects with bad diabetic control. A non significant association was found between control of diabetes and severity of NPDR in the present study.

In this study we found a significant association between ocular complication of diabetes and presence of family history of diabetes. 64 subjects had positive family history in this study.(p < 0.05)

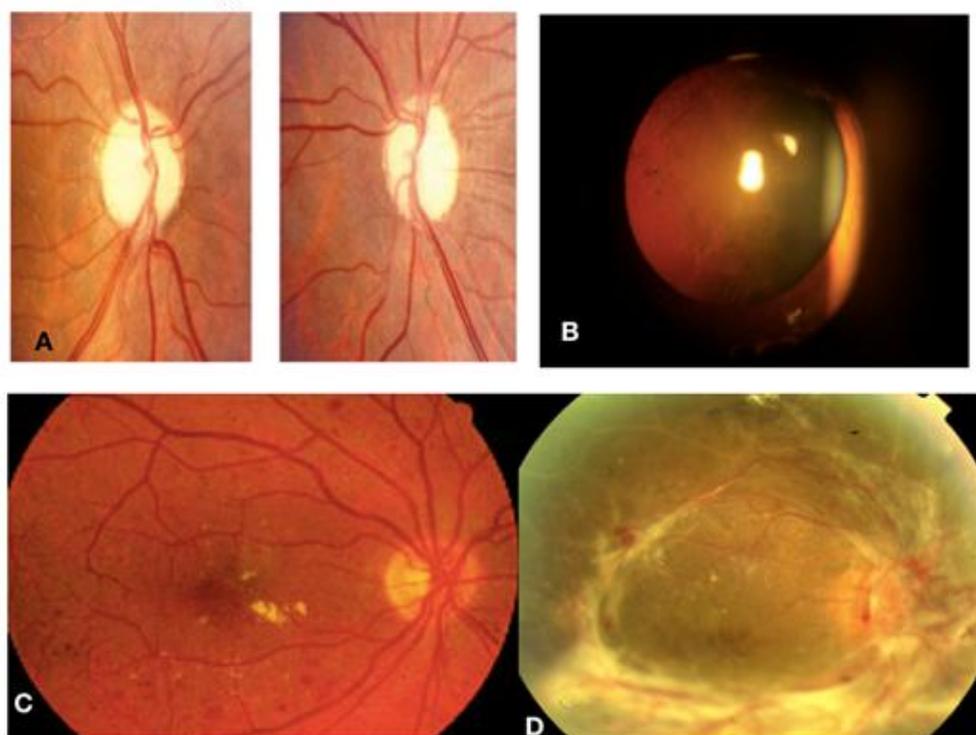


Fig 2 : Ocular Manifestations of Diabetes Mellitus in the study group.

Fig A : Bilateral Optic Atrophy Fig B : Posterior Sub Capsular Cataract Fig C : Macular Edema Fig D : Diabetic Retinopathy

IV. Discussion

Ocular complications and their frequency of occurrence :

In the present study we found retinopathy to be the most common ocular complication occurring in diabetes subjects (64%). The prevalence of cataract was 20% followed by Primary open angle glaucoma (4%) and extra ocular muscle palsy (4%). The prevalence of diabetic retinopathy varied from 28.8% in persons who had diabetes for less than five years to 77.8% in persons who had diabetes for 15 or more years in a study conducted by Klein et al (5). Findings similar our present study regarding primary open angle glaucoma prevalence was found in studies conducted by Armstrong et al (6). Diabetes is the underlying cause in 25–30% of patients aged 45 years and older who develop acute extra ocular muscle palsy (Rush JA) (7). In a study by Watanabe K, 1% of patients with diabetes were found to have cranial nerve palsies, compared with only 0.13% of control subjects.(8). We found a prevalence of 2% BRVO amongst diabetics in our study while BRVO were detected in 0.79% in a study conducted by Kawasaki R.(9)

Cataract

Characteristic diabetic cataract was found in only 4(20%) of patients with cataract. The highest incidence of cataract was found in the 41-45 yrs age group. Cataract was more common in female patients (65%). Increased incidence of cataract in female diabetic patients was also noted similarly in a study by Harding JJ et al (10) and Raman (11)

Type of diabetes and associated ocular complication

A non significant association was noted between the type of diabetes and associated ocular complication in the present study. In our study 26.7% of patients with type 1 diabetes mellitus had NPDR while 54.1% of patients with type 2 diabetes mellitus had NPDR. The prevalence of NPDR was higher in type 2 diabetes subjects, while the prevalence of PDR was higher in subjects with type 1 diabetes (13.3%) This result is similar to the results obtained by Muawyah. (10) We found 5.9% of type 2 diabetes subjects having CSME while none of the subjects with type 1 diabetes had CSME.

The prevalence of maculopathy was remarkably high (42% in type 1 and 53% in type 2 diabetic patients) in a study conducted by zander et al (12)

Duration of diabetes and associated ocular complication

In this study we found a significant correlation between duration of diabetes and associated ocular complication. The most notable complications seen with increased duration of diabetes was NPDR (seen in 61.5% subjects with diabetes for 6-10 year duration). Increased incidence of retinopathy with increase in duration of diabetes (type1 and type 2) was noted in studies conducted by Klein et al(13) and Yanko et al(14). Increased incidence of CSME was noted as the duration of diabetes increased (5.8% of subjects with diabetes in the duration range of 6-10yrs had CSME while 10.5% of subjects with diabetes in the duration range of >10 years had CSME). Similar increased incidence of CSME with increased duration of diabetes was noted in a study by Varma et al. (15)

Retinopathy versus regular and irregular treatment

The subjects taking regular treatment(oral tablets/insulin) had lower prevalence of mild NPDR(35.7%), moderate NPDR(45.5%) and severe NPDR(33.1%) when compared to the group not taking treatment regularly. Regular treatment and follow up should be stressed in the management of diabetes mellitus. In a study conducted by jacobson et al (16) Compared with individuals with continuous follow-up, patients with irregular clinical visits were more likely to be from families of lower socioeconomic class levels, have a parental history of separation and divorce, and were members of families that reported being least openly expressive of positive emotions. Poor glycemic control in year 1 was associated with irregular follow-up in years 2 through 4. Patients with irregular follow-up continued to have worse glycemic control in years 2 through 4 than patients with continuous follow-up. Retinopathy occurred more frequently among those in the irregular follow-up group

Severity of NPDR versus control of diabetes

We noted that patients with good diabetic control had lesser prevalence of mild NPDR (28.6%), moderate NPDR (42.4%) and severe NPDR when compared with subjects with bad diabetic control. Diabetes control and complication trial (17) and United Kingdom prospective diabetic study (18) both showed that intensive blood glucose control retards the rate of progression of diabetic retinopathy

Presence of family historyof diabetes

We found a significant association between ocular complication of diabetes and presence of family history of diabetes. 64 subjects had positive family history in this study. Familial inheritance of diabetes is a well known complication and was also noted in a study by Mykkänen.(19)

V. Conclusion

DM and its ocular complications remain a major cause of blindness despite increased understanding of these ocular conditions and identification of successful treatments. All of diabetic ocular complications can be prevented by early diagnosis and therapy. Therefore, periodic eye examinations are required for the reduction of diabetes-related vision loss.

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