Research Paper

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Dry Eye in Diabetic Retinopathy

Medical Science

KEYWORDS : dry eye, diabetic retinopathy, tear break up time

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ABSTRACT

Introduction: Diabetes is one of the most common causes of blindness.Diabetic patients complain of burning and foreign body sensation which are the symptoms of dry eye . Diabetic retinopathy is correlated with reduced tear film function.

Materials and methods: The study was done on 100 eyes of 50 diabetic patients attending KIMS ,Bangalore. Detailed ophthalmic evaluation was done. Dry eye was confirmed by fluorescein dye staining, tear film break up time (TBUT)and Schirmer I test .

Results : Out of the 50 diabetic patients ,34 were male and 16, female. Of the 100 eyes studied. Schirmer I test was positive in 34 eyes and TBUT positive in 66 eyes. Many eyes showed both Schirmer I and TBUT positive simultaneously associated with longer duration of diabetes.

Conclusion: patients with diabetes tend to develop tear film dysfunction. Early diagnosis and treatment prevents complications like vision deficit and secondary bacterial infection.

Introduction

Diabetes is one of the most common leading causes of blindness in 20–74-year old persons . Cataract and retinopathy are well-known as ocular complications of diabetes. The normal tear film on the surface of the eye is made up of three layers. The outer most the lipid layer secreted by meibomian glands, dysfunction of which results in evaporative dry eye. Middle aqueous layer secreted by the lacrimal gland, deficiency of this layer results in hyposecretive dry eye and inner most is the mucin layer secreted by the conjunctival goblet cell, crypts of Henle and glands of Manz. Deficiency of this layer is the feature of both hyposecretive and evaporative state.1 Patients suffering from dry eye syndrome often complain of foreign body sensation, discomfort, redness and irritation. Many patients suffering from diabetes mellitus which is a systemic disease often complain of burning and foreign body sensation which are the symptoms of dry eye syndrome.2 The tear film of diabetic patients has been reported to be unstable.3 Diabetes mellitus affects eye in many ways such as diabetic retinopathy, neovascular glaucoma, cataract, refractive errors and keratoconjunctivitis sicca.2Diabetic retinopathy is correlated with a decline in tear film function.4

In children with type 1 diabetes, there is reduced tear production and tear film stability compared to non-diabetic controls. In addition, 7% of children with diabetes were found to have dry eye compared to 0% of age-matched controls.5

It is hypothesized that peripheral neuropathy may affect the function of the lacrimal gland

Patients suffer from a variety of corneal complications including superficial punctuate keratopathy, trophic ulceration, and persistent epithelial defect. One of the most common reasons for dryness is aging process. Aldose reductase, the first enzyme of the sorbitol pathway, may also be involved. There is a correlation between the glycated hemoglobin (HbA1C) and the presence of dry eye syndrome. Also, diabetic patients have lower values of tear secretion and values of tear break up time test (TBUT).So, patients with diabetes tend to develop tear film dysfunction. Dry eye can lead to vision deficit, scarring and perforation of the cornea and secondary bacterial infection. If this syndrome is diagnosed at first stage and treated,they would be protected from its complications. Therefore early diagnosis of dry eye syndrome in diabetic patients is important for beginning of treatment in early stages.

Materials and methods

The study was done on 100 eyes of 50 patients attending Kempegowda Institute of Medical Sciences ,Bangalore on inpatient or out patient basis including new and review cases of diabetes. An informed consent of the participating patients was taken following which using a pre structured proforma baseline data collected.

The subjects were evaluated by ophthalmologist under the following:

Detailed history : Clinical data of all patients which included sex, age ,occupation, duration of diabetes as well as a history of other diseases was noted. Dry eyes were suspected on the basis of a history of ocular discomfort, including soreness, gritty sensation, itchiness, redness, blurred vision that improves with blinking and excessive tearing.

Detailed ophthalmic evaluation included anterior segment examination by slit lamp biomicroscopy and fundus examination under mydriatics using direct ophthalmoscopy,indirect ophthalmoscopy and +90D lens. Diabetic retinopathy was graded according to Early Treatment Diabetic Retinopathy (ETDRS) criteria . The condition of dry eye was confirmed by ocular surface dye staining pattern with fluorescein, tear film break up time (TBUT) (value 15s) and Schirmer I test (value 15 mm in 5 min), according to American Academy of Ophthalmology.

Diagnosis was established by positivity one or more of the tests (TBUT or Schirmer test).Other investigations like complete blood count, blood urea, serum creatinine, urine routine, chest x ray, ecg and echo were done.

Inclusion criteria included all diabetic patients, newly detected or under review.

Exclusion criteria included cigarette smoking, contact lens, Lasik surgery, allergies, Sjogren's syndrome, rheumatoid arthritis, Parkinson, lupus, some medications such as antihistamines, tricyclic antidepressants, oral contraceptives, and drugs used to treat high blood pressure and diuretics,Vitamin A deficiency and pregnancy were excluded.

Results

Out of the 50 diabetic patients under study,34 were male(68%) and 16 were female(32%). Total number of eyes subjected to

diagnostic tests were 100.45 eyes(45%) had normal study.20 eyes(20%) showed mild non proliferative diabetic retinopathy changes.25 eyes (25%) showed moderate non proliferative retinopathy changes and 1 eye(1%) showed severe non proliferative change.9 eyes(9%) showed proliferative diabetic retinopathy changes .Slit lamp examination did not reveal any co-existent conjunctivitis or any other ocular surface disease.

The patients were studied after grouping them into categories based on the duration of the disease.29 patients (58%) had diabetes mellitus ranging from 0 to 5 years.7 patients (14%) had diabetes mellitus ranging from 6 to 10 years.9 patients (18%) had diabetes mellitus ranging from 11 to 15 years and 5 patients (10%) in the range of 16 to 20 years.(table 1) Of the 100 eyes studied,24 eyes had normal tear function tests. Schirmer I test was positive in 34 eyes and tear break up time test positive in 66 eyes.Many eyes showed both Schirmer I and tear break up time test positive simultaneously.

Among the 100 eyes studied, abnormal Schirmer I and tear break up time was found to be associated with longer duration of diabetes mellitus and higher grade of diabetic retinopathy.

Discussion

Dry eye is a disorder of tear film because of tear deficiency or excessive tear evaporation which causes damage to the inter palpebral ocular surface and is associated with symptoms of ocular discomfort. With early diagnosis and treatment ,complications like secondary microbial infection and corneal ulceration could be avoided.6

Patients with diabetes have dry eye syndrome more often than those without diabetes. Diabetes mellitus is a systemic disease which is often accompanied by microvascular complications such as neuropathy, nephropathy and retinopathy.7 The prevalence of diabetic microvascular complications is higher in patients with longer duration of diabetes.8 These individuals are at an increased risk of developing dry eye syndrome. Seifart and associates demonstrated that diabetic patients had an increased rate of keratoconjunctivitis sicca, which may be attributed to decreased corneal sensitivity, neuropathy involving innervation of lacrimal glands and loss of goblet cells.7

Corneal nerve alterations, probably caused by direct hyperglycemic and/or microvascular damage to the tissue lead to neurotrophic lesion and block the feedback mechanism that controls tear secretion9. They seem to occur later in the process, but certainly have a crucial role in severe presentations of the diabetic dry eye.

Seifart et al compared 92 patients with diabetes types I and II and aged from 7 to 69 years with a group of normal healthy controls comparable in number, age and sex. The results show that 52.8% of all diabetic subjects complained of dry eye symptoms, as against 9.3% of the controls. They concluded close monitoring of diabetic patients and good blood sugar regulation is important for the prevention of dry eye syndrome and retinopathy.

There are five stages of diabetic retinopathy. The first is "no apparent retinopathy". The second stage is "mild non-proliferative retinopathy" (NPDR) which is characterized by the presence of a few microaneurysms. The third stage is "moderate NPDR" which is characterized by the presence of microaneurysms, intraretinal hemorrhages or venous beading ."Severe NPDR", based on the 4:2:1 rule of the ETDRS. If hemorrhages are present in all 4 quadrants, then severe NPDR is present. If 2 quadrants or more have venous beading (VB) , then severe NPDR is present. If one or more quadrant has intraretinal microvascular abnormalities (IRMA), then severe NPDR is present. The final stage is "proliferative diabetic retinopathy" (PDR). PDR is characterized by neovascularization of the disc, neovascularization of the retina, iris,angle, vitreous hemorrhage or tractional retinal detachment.

The measurement of the break up time of the tear film (as assessed by measuring the time interval between a complete blinking and the formation of dry spots in a fluorescein stained tear film) is a very rough test for the determination of tear film stability. Large interindividual and intraindividual deviations can be found even when performed in a standardised procedure.

Changes of tear function parameters in diabetes have been studied. Dogru et al10 reported that BUT and basal tear secretion were decreased, especially in diabetes with poor metabolic control and peripheral neuropathy, but they were not related to the duration of diabetes or the stage of retinopathy, suggesting a neuropathy involving the innervation of the lacrimal gland. Nepp et al11and Ozemir et al12 reported that abnormal tear function tests were associated with poorer metabolic glucose control, panretinal argon laser photocoagulation, and PDR Decreased reflex tearing in diabetes may be the result of a diminished corneal sensitivity, and decreased tear production and abnormal tear composition may result in superficial ocular lesion.

Age	Duration(in yrs)			
	0-5	6-10	11-15	16-20
11-20	1	-	-	-
21-30	1	-	-	-
31-40	6	1	-	-
41-50	9	1	-	-
51-60	8	1	1	2
61-70	4	4	6	-
71-80	-	-	1	3
81-90	-	-	1	-
total	29	7	9	5

Table 1: Duration of diabetes

Fig 1:Ophthalmoscopic findings in severe NPDR(Right eye)

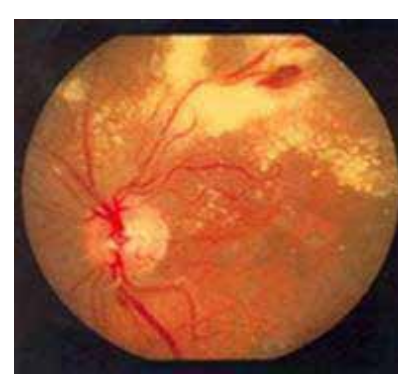

Fig 2:Ophathalmoscopic findings in proliferative diabetic retinopathy(left eye).

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