To study prevalence of dry eyes in diabetic patients

Syed Ali Nasar Waris[1], R S Naveen Balaji[2,*], Rubina Huda[3]

[1,3]Assistant Professor, [2]Resident, Dept. of Ophthalmology, SRM Medical College and Hospital, Tamil Nadu, India

***Corresponding Author: R S Naveen Balaji**
Email: drsanwaris@rediffmail.com

Abstract

Introduction: One of the most important cause of dry eye is diabetes mellitus. Longer the duration of diabetes in a patients, higher is the chance of developing dry eye. Level of blood sugar in diabetic patients also has a role to play in causing dry eye disease. It is seen that dry eye disease is more common in patients with poor blood sugar control. In India, not much studies has been done on dry eyes in diabetic patients. This study was carried out in an attempt to find out prevalence of dry eye in diabetic patients.

Materials and Methods: Hospital based prevalence study of hundred patients with type II diabetes was conducted in SRM medical college and hospital between august 2012 and July 2013.Detailed diabetic history, slit lamp bio microscopy, Schirmers test, tear break up time, fluorescein staining, Rose Bengal staining were done, along with a standard questionnaire.

Results: Forty three (43%) type II diabetes patients had dry eye in our study. A significant association is found in dry eye with poor glycaemic control [p-0.001] and with longer duration of diabetes [p<0.05].

Conclusion: Good glycaemic control is essential to reduce the prevalence of dry eye. Examination of dry eye should be considered as an integral part in the assessment of diabetic eye diseases.

Keywords: Diabetes mellitus, Glycaemic control, Prevalence, Dry eye.

Introduction

Type-II diabetes mellitus is a multi-factorial disease characterized by hyperglycemia resulting from defective insulin secretion or insulin resistance in peripheral tissues.[1,2] Diabetes mellitus is associated with a number of ocular complications which can lead to blindness. Diabetic retinopathy, neo vascular glaucoma, cataract, refractory error, ptosis, palsy of the cranial nerves are typical ocular complications in diabetic patients.[3]

Diabetics patients suffer from a variety of corneal complications, including superficial punctuate keratopathy, corneal ulceration, and persistent epithelial defects. Many diabetic patients complaint of foreign body sensation, indicating a clear role for tear film abnormalities.[4] Various studies have reported qualitative and quantitative tear film abnormalities in diabetics, but the precise role of these abnormalities in the pathogenesis of dry eyes is not well understood[5]. More often ocular surface examination is ignored and much importance is given to retinopathy only. A review of the literature showed that dry eye disease was found in every one out of two patients with diabetes mellitus[6,7]. Manaviatet et al[8] did a study where 54.3%diabetic patients had dry eye disease.

In order to initiate dry eye treatment in diabetic patients, we first have to identify dry eye as early as possible. There is scarcity of studies in India relating to prevalence of dry eyes and ocular surface disorders in diabetic patients.

Our study was undertaken to assess the prevalence of dry eye in type II diabetes mellitus patients and to study its association with duration of the diabetes and glycemic control.

Materials and Methods

The objectives of the present study was to know the prevalence of dry eye in patients with type II diabetes mellitus attending ophthalmology department. We also studied the association of dry eye, with the duration of diabetes and blood sugar level. This cross section study was conducted in the Department of Ophthalmology, SRM medical college and hospital during the period of august 2012 to July 2013. Data collected and analyzed for 100 patients diagnosed with type 2 diabetes mellitus attending Ophthalmology outpatient department. Patients with rheumatoid arthritis, chronic contact lens user, post LASIK patients, patients using local or systemic medications, known to cause ocular surface abnormalities were excluded from study. Approval has been taken from the Ethical committee. The Statistical software namely SPSS 11.0 and SYSTAT 8.0 were used for the analysis of the data.

Results

In our study burning sensation (61%), redness (55%), watering (51%) were the predominant symptoms reported compared to gritty feeling (46%), eyes feeling dry (43%), stickiness (34%), eyes stuck (34%) and crusting (4%) as seen in Table 1. In our study TBUT ≤ 10 was found in 36 patients and Schirmers test ≤ 10 in 44 patients. Fluorescence staining was positive in 25 patients and rose Bengal test was abnormal in 36 patients as seen in Table 2.

The prevalence of dry eye was 43% in our study of hundred patients of Type II diabetes. Out of 43% of diabetic dry eye patients, 14% had mild dry eye, 25% moderate dry eye and 4% had severe dry eye (Table 3). There is an association between duration and dry eye at 95% [P value < 0.05]. Dry eye is significantly associated with duration more than 6 years of type II diabetes patients (Table 4). There is an association between HbA1c and dry eye at 95% [P < 0.05]. In our study dry eye was more prevalent in diabetic patients having HbA1c more than 8 as seen in Table 5.

Table 1: Response to dry eye questionnaire

		Frequency	Percent
Eye Feeling dry	Negative	57	57.0
	Positive	43	43.0
Gritty Feeling	Negative	54	54.0
	Positive	46	46.0
Burning Sensation	Negative	39	39.0
	Positive	61	61.0
Stickiness	Negative	66	66.0
	Positive	34	34.0
Watering	Negative	49	49.0
	Positive	51	51.0
Redness	Negative	45	45.0
	Positive	55	55.0
Crusting	Negative	64	64.0
	Positive	4	4
Eye Stuck	Negative	66	66.0
	Positive	34	34.0

Table 2: Clinical test results of dry eye

Tests	Tear Breakup time	Schrimers	Fluorescence staining	Rose bengal stain
Normal	54	56	75	64
Abnormal	36	44	25	36

Table 3: Prevalence of dry eye

Severity	Dry eye
Mild	14
Moderate	25
Severe	4
Normal patients	57

Table 4: Association of duration of diabetes with dry eye

Duration years	Dry Eye Grade				Chi square Test	P Value
	Normal	Grade1	Grade 2	Grade 3		
1 – 5	43	6	6	0	24.218	0.001
6 – 10	12	4	15	1	2 DF	**
11 – 20	2	4	4	3		
Total	57	14	25	4		

Table 5: Association of glycemic control with dry eye

HBa1c	Normal	Grade 1	Grade 2	Grade 3	Chi square	P value
<5.6	27	0	2	0		
5.6 – 7.0	21	2	5	0		
7.1 – 8	4	4	2	1	44.760	0.001
>8	5	10	16	3		
Total	57	14	25	4		

Discussion

Every clinician is familiar with the considerable discrepancy between the subjective complaints of patients and the clinical tests available to assess dry eye. In our study, we used a standard questionnaire to access symptoms along with fluorescein and rose Bengal staining. Tear breakup time (TBUT) and Schirmer test were also done. We have included diabetic patients having abnormal tear breakup time or lower Schirmer value in our study. According to a Canadian Dry Eye epidemiology study, thirty seven percent of patients with diabetes had dry eye symptoms. The prevalence of dry eye in Indian population was 18.4% as reported by Sahai Ansu et al.[9] The prevalence of dry eye has been varying in different studies.

We found that 43% of diabetic patients had dry eye in our study. There are other various studies reporting dry eye

association in diabetic patients. The prevalence of dry eyes reported in various studies are Seifart et al 70%,[10] Moss et al 18%,[11] Inoue et al 22.8%,[12] Beaver Dam eye study 19.8%,[13] Masoud et al 54.3%[14] and Nepp et al[15] 43% of diabetic patients.

There is range of prevalence of dry eye seen in various studies from 18.1% to 70%, thereby showing wide disparity. Since there are no standard set for patient selection, standardised dry eye questionnaires and objective tests, there is a large disparity in prevalence of dry eye in various studies.

We found mild dry eye was present in 14% patients, 25% had moderate dry eye and severe dry eye was seen in 4% patients. A duration of more than six years of diabetes should be considered as important to rule out dry eye. In our study [p value<0.05] 31% patients having dry eye had history of diabetes of duration more than 6 years. Klein et al[16] showed a higher association of dry eye with longer duration of diabetes. Similarly Tumaso et al[17] reported correlation between severity of dry eye and duration of diabetes.

The prevalence of dry eye was 54.1% in Siefart et al[10] study and these patients had HbA1c more than 8.5.In our study 29 patients out of 43 had poor glycaemic control (HbA1c more than 8). Association of poor glycaemic control was significantly related with Dry eye in type II Diabetic patients [p value 0.001]. Kaiserman and associates[18] have reported that good blood sugar regulation is important for prevention and control of dry eye syndrome among diabetic patients. Shultz et al[19] reported 47-64% of diabetic patients having corneal lesions as persistent epithelial defect, delayed epithelial healing, corneal ulceration. In the conjunctiva and cornea of diabetic patients there are structural and metabolic abnormalities which has an important role to play in causing dry eye disease.There are other various studies reporting dry eye association. Primary corneal lesion has been seen in 47-67% of diabetic patients. The incidence of keratoepitheliopathy in diabetic was found to be 22.8%wheras it was 8.5%in nondiabetic patients. Tear secretion abnormalities has been playing a significant role in development of diabetic keratoepitheliopathy such as superficial punctate keratopathy, recurrent corneal erosion, and peripheral epithelial defect. Severity of keratoconjunctival sicca is related with severity of diabetic disease, as shown by Nepp et al.[15]

Blepharitis and meibomitis are well known to contribute evaporative dry eyes. In our present study 9 patients had blepharitis out of which 3 had dry eyes, meibomitis was present in 16 patients of which 12 had dry eyes. Blepharitis was more common in Type II diabetic patients. In the present study predominant symptoms reported were burning sensation (61%), redness (55%), watering (51%) of which 35%, 28% & 29% had dry eyes respectively. Goebbels M et al mentioned that diabetic patients having dry eye complain of burning and foreign body sensation.[20]

Tear film instability leads to evaporative or deficiency dry eye, which is detected by tear breakup time (TBUT). In the present study TBUT was positive for dry eye in 36% cases.

Schirmers has been the most common test for measuring dry eyes. In our study the Schirmers test was ≤10 mm in 44% patients. This shows that reduced Schirmer values were found in diabetic patients.

In our study ocular surface damage was assessed by Rose Bengal and fluorescein stain. It was 36% and 25% respectively. Rose Bengal staining showed more positive dry eye compared to fluorescein staining. Rose Bengal stain has an affinity for dead and devitalized epithelial cells,[21] so a higher percentage of diabetics had a positive test.[22] Out of 43 dry eye patients, corneal sensation was reduced in 14 patients. It may be due to some kind of diabetic neuropathy. Reduced corneal sensitivity has been reported earlier by Yagi et al.[23]

Patients with diabetes have dry eye syndrome more often than those without diabetes. Hence dry eye is to be considered while examining diabetic patients, especially who have poor glycaemic control and longer duration of diabetes mellitus.

Conclusion

Dry eye was found to have significant association with type II diabetes mellitus. Poor glycaemic control was associated with higher prevalence of dry eye. Longer the duration of diabetes in a patients, higher is the chance of developing dry eye. Level of blood sugar in diabetic patients also has a role to play in causing dry eye disease. Therefore dry eye should be kept in mind during examining diabetic patients specially who have poor glycaemic control and longer duration of disease.Since it has been found that dry eye disease is more common in patients with poor blood sugar control, good glycaemic control is essential to reduce the prevalence of dry eye. Examination of dry eye should be considered as an integral part in the assessment of diabetic eye diseases.

Conflict of Interest: None.

References

1. Fauci A, Braunwald E, Iselbacher KJ. Harrison's Principles of Internet Medicine Companion Handbook 14th ed. New York: MC Graw Hill 1998:943-946.
2. Robbins SL, Cotran RS, Kumar V. Pocket Companion to Robbins Pathologic Basis of Disease, 5th ed. Philadelphia, PA: WB Saunders Co., 1995 :367-374.
3. Hom M.M. 12th Annual Diabetes Report: Diabetes and Dry Eye - The Forgotten Connection. Review of Optomtry 2010; Available from:URL:http://www.revoptom.com/continuing_education/tabviewtest/l essonid/106952/ Access date:13.03.2012
4. Alves M. C, Carvalheira J.B, Módulo C.M, Rocha E.M. Tear film and ocular surface changes in diabetes mellitus. *Arq Bras Oftalmol* 2008;71(6):96-103.
5. Hom M, De Land P. Self-reported dry eyes and diabetic history. *Optom* 2006;77(11):554-558.
6. Knowler WC, Fowler SE, Hamman RF, Christophi CA, Hoffman HJ, Brenneman AT, et al. 10-year follow-up of diabetes incidence and weight loss in the Diabetes Prevention Program Outcomes Study. *Lancet* 2009;374 (9702):1677-1686.
7. Moss S.E, Klein R, and Klein B.E, Prevalence of and risk factors for dry eye syndrome. *Arch Ophthalmol* 2000;118:1264–1268.

8. Manaviat MR, Rashidi M, Afkhami-Ardekani M, Shoja MR. Prevalence of dry eye syndrome and diabetic retinopathy in type 2 diabetic patients. *BMC Ophthalmol* 2008;8:10.
9. Anshu S, Malik P. Dry Eye: Prevalence and Attributable Risk Factors in a Hospital-Based Population. *Indian J Ophthalmol* 2005;53:87-91.
10. Seifart U, Strempel I, Trockenes A. The dry eye and diabetes mellitus. *Ophthalmol* 1994;91:235–239.
11. Moss S.E, Klein R, Klein B.E. Prevalence of and risk factors for dry eye syndrome. *Arch Ophthalmol* 2000;118:1264-1268.
12. Inoue. Ocular and systemic factors relevant to diabetic keratoepitheliopathy. *Cornea* 2001:798-801.
13. Lemp M.A. Report of the National Eye Institute/Industry Workshop on clinical trials in dry eyes. *CLAO J* 1995;21:221-232.
14. Manaviat M.R. Prevalence of dry eye syndrome and diabetic retinopathy in type 2 diabetic patients. *BMC Ophthalmol* 2008;8:10.
15. Nepp J, Abela C and Polzer I. Is there a correlation between the severity of diabetic retinopathy and Keratoconjunctivitis sicca ?. *Cornea* 2000;19:487–491.
16. Klein R, Klein B.E, Moss S.E, Davis M.E, DeMets D.L. Prevalence and risk of diabetic retinopathy when age at diagnosis is 30 or more years. *Arch Ophtalmol* 1984;102:4527-32.
17. Tumosa N. Eye disease and the older diabetic. *Clin Geriatr Med* 2008;24:515-527.
18. Kaiserman I, Kaiserman N, Nakar S. Dry eye in diabetic patients. *Am J Ophthalmol* 2005;139:498–503.
19. Schultz R.O, Van Horn D.L, Peters M.A. Diabetic keratopathy. *Trans Am Ophthalmol Soc* 1981;79:180–99.
20. Goebbles M. Tear secretion and tear film function in insulin dependent diabetics. *Br J Ophthalmol* 2000;84:19–21.
21. Kanski J.J. The Dry Eye. In: Clinical Ophthalmology. 5th ed. Butter Heinemann. *London* 2003;56-61.
22. Rahman A. Diagnostic value of tear films tests in type 2 diabetes. *JPMA* December 2007.
23. Xu KP, Yagi Y, Tsubota K. Decrease in corneal sensitivity and change in tear function in dry eye. *Cornea* 1996;15(3):235-239.

How to cite this article: Waris SAN, Balaji RSN, Huda R. To study prevalence of dry eyes in diabetic patients. *Indian J Clin Exp Ophthalmol* 2019;5(1):40-43.