Original Article

Ophthalmology and Allied Sciences
Volume 4 Number 1, January - April 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4118.2

Dry Eye Syndrome in Type II Diabetic Patients Attending A Medical College Teaching Hospital

Gnanajyothi C. Bada*, Satish S. Patil**

*Assistant Professor, Department of Ophthalmology, Khaja Banda Nawaz Institute of Medical Sciences, Kalaburagi, Karnataka 585104, India. **Assistant ProfessorDepartment of Physiology, M R Medical College, Kalaburagi, Karnataka 585105, India.

Abstract

Introduction: Diabetes mellitus is one of the leading health problem all over the world. Dry eye syndrome (DES) is common in diabetes mellitus. The study was done to detect theprevalence of DES in type II diabetic patients and to determine the association of dry eyes with diabetic retinopathy.

Methodology: Diabetic patients(n=200) attending Ophthalmology OPD at Khaja Bande Nawaz Institute of Medical Sciences (KBNIMS), Kalaburagi during the period fromApril to December 2017 were included in the study group, basedon the inclusion & exclusion criteria.

Results: Our study showed that the prevalence of DES in diabetes was 51%, with higher rate in females and older age group. 33% of diabetic retinopathy patients had DES even though it was not statistically significant.

Conclusion: Since there exists an association between diabetes and DES, all diabetic patients should be screened for DES to prevent ocular surface damage.

Keywords: Diabetes Mellitus; Diabetic Retinopathy; Dry Eye Syndrome (DES).

Introduction

Diabetes mellitus is one of the leading health problem all over the world [1]. India with the highest number of diabetic population has been identified by WHO as "the diabetic capital of the world". WHO estimates that the diabetic population in the world would rise to 370 million by 2030, which is double the figure reported in 2000 [2]. Diabetes mellitus is characterized bychronic hyperglycaemia that leads to microvascular complications like peripheral neuropathy, nephropathy, and retinopathy. Ocularcomplications of diabetes mellitus include cataract, glaucoma, retinopathy, punctuate keratitis, and recurrent corneal lesions [3]. Dry eye syndrome (DES/ keratoconjunctivitis sicca) is common in diabetes mellitus. The prevalence of DES has been found to be around 54% [4]. DES isa multifactorial disease of the tears and ocular surface that results in symptoms of discomfort, visual disturbance, and tear-film instability with potential damage to the ocular surface [5]. Symptoms of DES range from mild transient irritation to persistent dryness, burning, itchiness, redness, pain, ocular fatigue and visual disturbance [6]. DES results in corneal and conjunctival epithelial alterations such as punctate keratopathy, recurrent erosions, persistent epithelial defects and neurotrophic keratopathy. Delayed wound healing withhigher risk of microbial keratitis and potential visual impairment due to corneal scarring may also be encountered in DES [7]. Diabetic Retinopathy (DR) is a progressive condition with microvascular alterations that lead to retinal ischemia, retinal permeability, retinal neo vascularization and macular oedema. All individuals with DM will be at risk of developing diabetic retinopathy. It is extremely important to classify and stage the severity of diabetic retinopathy in order to establish adequate therapy. If left untreated, patients with diabetic retinopathy can

Corresponding Author: Gnanajyothi C. Bada, Assistant Professor, Department of Ophthalmology, Khaja Banda Nawaz Institute of Medical Sciences, Kalaburagi, Karnataka 585104, India.

E-mail: drgnanajyothi@gmail.com

Received on 27.01.2018, **Accepted on** 09.02.2018

suffer severe visual loss. Early Treatment Diabetic Retinopathy Study (ETDRS) is the gold standard for the classification of diabetic retinopathy. With proper management more than 90% of cases of visual loss can be prevented. Chronic uncontrolled DM can lead to both dry eye syndrome and diabetic retinopathy [8]. Thus, to improve the quality of life and to prevent the complications it becomes imperative for the early diagnosis of DES and retinopathy in patients with diabetes mellitus.

Aims and Objectives

i. To study the prevalence of dry eye syndrome in Type 2 diabetes mellitus patients, among those attending the Ophthalmology OPD.
ii. To determine the association of dry eyes with diabetic retinopathy.

Materials and Methods

Type2 diabetic patients (n=200), attending Ophthalmology OPD at KBNIMS, Kalaburagi were included in the study group, during the period of April -December 2017.

Inclusion Criteria

Patientswith type 2 diabetes mellitus of all age groups and of both sexes.

Exclusion Criteria

1. Patients with previous ocular surgeries.
2. Patients using contact lens.
3. Patients with systemic and ocular diseases which can cause dry eye.
4. Patients using systemic and topical medications which can cause dry eye.

Methodology

The patient's history of diabetes with respect to the duration, thetreatment of diabetes and diabetic control was recorded. A detailed history regarding ocular symptoms of dry eye like irritation, tearing, burning, foreign body sensation, photophobia, blurry vision and redness was also elicited. Detailed ocular examination including visual acuity, slit lamp examination, intraocular pressure and dilated fundus examination of all the patients was done.

Tests for Dry Eye

• *Tear Meniscus Test*

Slit lamp examination of the inferior tear meniscus, which is normally 1.0mm in height and convex. A tear meniscus that is 0.3mm or less is considered abnormal.

• *Tear Break up Time(TBUT)*

A fluorescein strip moistened with sterile saline is applied to the tarsal conjunctiva. After several blinks, the tear film is evaluated using a broad beam of the slitlamp with a blue filter. The time lapse between the last blink and the appearance of the first randomlydistributed dry spot on the cornea is the tear break up time.Break-up time less than 10 seconds is considered abnormal.

• *Schirmer'Stest*

Basic secretion test is performed after instillation of a topical anaesthetic.It is performed by placing a narrow filter-paper strip (Whatmann Filter paper No: 41) in the lower fornix at the junction of middle and lateral thirds with 5 mm of the paper folded within the inferior cul-de-sac. Aqueous tear production is measured by the length in millimetres that the strip wets during the test period of 5 minutes.Less than 10mm of wetting after 5 minutes is diagnostic of dry eye.

- Dry eye was defined as withthose having one or more symptoms present for most of the time, along with one or more positive clinical tests i.e. tear break up time of ≤ 10 seconds, Schirmer's test score ≤ 10mm.
- Dilated fundus examination with direct ophthalmoscopy, indirect ophthalmoscopy and slit lamp bio microscopy using 90 D lens was done to note for diabetic retinopathy. Grading of diabetic retinopathy was done as per the Early Treatment Diabetic Retinopathy (ETDRS) classification.

Statistical Analysis

Statistical data was analysed by using SPSS 20.0 version. Chi-square test was applied for significance. P value < 0.05 considered as statistically significant.

Results

In the present study, out of 200 type II diabetic patients, 102 patients were diagnosed to have dry

eye. Table 1 shows the sex wise distribution of type II diabetic patients with dry eyes.The study reveals that, there were 108 (54.0%) females, 92 (46.0%) males in the study. Males with dry eye cases were 42 (45.6%) and females with dry eye cases were 60 (58.8%). However there was no statistical significance oftype II diabetes with dry eyes with male and female patients.

Table II depicts the association of age with dry eyes. In the study, maximum numberof type II diabetes cases {72 (36.0%)} were in the age group of 51-60 years. The age group of 51-60 years also contains the maximum number of dry eyescases i.e.48 (66.7%). In the age group of 61-70 years, there were 61 diabetes cases (30.5%) and 36 (59%) dry eyes cases were reported. In the age group of less than 40 years there were only 2 diabetes cases (1.0%) and no dry eyes cases were reported. In the age group of>70 years there were 30 (15%) diabetic patients among whom 16patients (53.3%) had dry eyes. In the age group of 41-50 years there were 35 diabetes cases (17.5%) and 2 (5.7%) of dry eyes cases. The association of age with dry eyes was statistically very highly significant (P<0.001).

Table 3 shows the clinical test results of dry eyes. TBUT clinical test detected 79 cases (39.5%) of dry eyes and Schirmer's test detected 64 cases (32.0%) of dry eyes.There was no statistical significant difference of detectionof dry eyes with clinical tests (P>0.05).

Table 4 depicts the association of DM with retinopathy. Study reveals that 66 (33.0%) diabetic patients had retinopathy while 134 (67.0%) patients had no diabetic retinopathy. Among the retinopathy cases maximum number of cases 38 (57.6%) were with mild NPDR, 19 (28.8%) cases were with moderate NPDR and 9 (13.6%) cases were in severe NPDR and PDR.

Table 5 shows the correlation between dry eye syndrome and diabetic retinopathy in diabetic patients. 68 patients had dry eye syndrome with no diabetic retinopathy and 34 patients had dry eyes in diabetic retinopathy group. However there was no statistical significant association between dry eyes and retinopathy (P>0.05).

Table 1: Sex wise distribution of Type II Diabetic Patients with Dry Eyes

Sex	No of Type II DM		With Dry Eye		P value
	Patients	Percentage	Patients	Percentage	
Male	092	46.0	42	45.6	X^2=1.92
Female	108	54.0	60	58.8	P>0.05
Total	200	100.0	102	51.0	Not Significant

Table 2: Association of Age with Dry Eyes

Age (Years)	Type II DM Patients		With Dry Eyes		P value
	No. of cases	Percentage	No. of cases	Percentage	
< 40	2	1.0	0	0.0	
41-50	35	17.5	2	5.7	X^2=40.12
51-60	72	36.0	48	66.7	P<0.001
61-70	61	30.5	36	59.0	
>70	30	15.0	16	53.3	Very Highly Significant
Total	200	100.0	102	51.0	

Table 3: Clinical Test Results of Dry Eyes

Test	Positive		Negative		Total		P value
	Patients	Percentage	Patients	%	Patients	%	
TBUT	79	39.5	121	60.5	200	100.0	X^2=2.44
Schirmer's test	64	32.0	136	68.0	200	100.0	P>0.05
							Not Significant

Table 4: Association of DM with Retinopathy

Retinopathy	No. of Cases	Percentage	Retinopathy Grades (%)	Percentage
No Retinopathy cases	134	67.0	--	--
Retinopathy cases	66	33.0	--	--
Mild NPDR			38	57.6
Moderate NPDR			19	28.8
Severe NPDR and PDR			09	13.6
Total	200	100.0	66	100.0

Table 5: Correlation between DES and DR in DM

Grade of Retinopathy	No of DM Patients	Dry eyes cases	Percentage	P value
No retinopathy	134	68	66.7	X^2=0.034
With Retinopathy	66	34	33.3	P > 0.05
Total	200	102	100.0	Not Significant

Discussion

Prevalence of DES: The study was done to determine the prevalence of DES in Type 2 diabetes mellitus patients and to determine the association of dry eyes with diabetic retinopathy, among those attending the ophthalmology OPD. In our study the prevalence of DES among the diabetics was found to be 51%. This prevalence rate is comparable to studiesdone worldwide. In the hospital based studies donein India the prevalence of DES among diabetics was 38% in Eluru, Andhra Pradesh [9], 42% in Navi Mumbai [10] and 36% in Mysore, Karnataka [11].

In studies done elsewhere in the world the prevalence of DES among diabetics was 49.8% in Kenya [12] , 54.3% in Iran [4] and 52.8% in Germany [13]. Racial and ethnicity differences in the prevalence of DES have been reported with higher prevalence of DES in Asia compared to studies in USA [14]. The high prevalence of DES in our study could be due to dry climate of our region.

DES is very common among the general population with 28% of the adults having DES [15]. However the prevalence of DES shows wide variation from 18% to 70%, which could be due to lack of standardisation of the study subjects, of the DES questionnaires, tests and diagnostic criteria of DES [9].

DES and Sex: Our study found higher prevalence of DES in females and was statistically significant. Similar comparable results were found in various other studies [4,16,17]. Androgens are known to produce trophic effects on the functioning of the lacrimal as well as the Meibomian glands. Menopause is associated with reduction in levels of androgens, resulting in dysfunctioning of both the glands and the resultant symptoms of DES [18].

DES and Age: In the present study the prevalence of DES shows an increase with age.Studies also report similar trend of increase in prevalence of DES with age [16,19]. The etiopathogenesis of DES in aging is due to reduction in production and flow of tear along with increase in evaporation of tear film [19]. Dysfunction of Meibomian gland and autonomic dysfunction have also been implicated in the increased prevalence of DES with age [20].

Clinical Test Results of Dry Eyes: The clinical test results of dry eyes in our study for different tests are 39.5%, 32%, for TBUT, Schirmer test, respectively. Similar comparable percentage results were also obtained in various other studies [9,10,11].

Among the tests for dry eyes, TBUT is said to be a very non-specific test for determination of tear film stability as variations in the same patient has been noticed [1]. Schirmer's test has been the standard test to measure the tear production [21]. Studies report that the results of the clinical tests of dry eyes do not correlate in clinical trials [9].

Association of Retinopathy with Dry Eyes: Our study reveals that there were 66 (33.0%) retinopathy cases and 134 (67.0%) no retinopathy cases. Among the retinopathy cases maximum number of cases 38 (57.6%) were with the mild NPDR, 19 (28.8%) cases were with moderate NPDR and 9 (13.6%) cases were with severe NPDR and PDR. 68 patients out of 134 with no diabetic retinopathy had dry eye and 34 out of 66 with retinopathy had dry eye which was not statistically significant. Study by Masoud Reza Manaviat et al showed dry eye syndrome was more frequent in diabetic patients with DR (P = 0.02).

DR was found in 140 patients (70.35%), which included 34 patients (17.1%) with mild non proliferative DR (NPDR), 34 patients (17.1%) with moderate NPDR, 22 patients (11.1%) with severe NPDR and 25 patients (25.1%) with proliferative DR (PDR) [4]. Pradeep Pakalapati et al have shown that there is an association between dry eye and diabetic retiopathy but it was statistically not significant [9].

Conclusion

Our study was done to know the prevalence of DES in type 11 diabetes mellitus. We found that prevalence was 51% probably due to dusty and dry weather. DES was more in females and diabetic retinopathy patients had DES though it was not statistically significant. Hence examination of dry eye should become a routine test to prevent the symptoms and structural damage to the ocular surface.

References

1. Ghasemi H, Gharebaghi R, Heidary F. Diabetes as a possible predisposer for blepharitis. Can J Ophthalmol 2008 Aug;43(4):485.
2. World Health Organization. Diabetes. Available at: www. researchandmarkets.com/reportinfo.asp?report_id=228279 (Accessed August 30, 2010).
3. Inoue, K., Kato, S., Ohara, C., Numaga, J., Amanto, S., & Oshika, T. Ocular and systemic factors relevant to diabetic keratoepitheliopathy. Cornea, 2001;20(8):798–801.
4. M.R. Manaviat, M. Rashidi, M. Afkhami-Ardekani, and M.R. Shoja, "Prevalence of dry eye syndrome and diabetic retinopathy in type 2 diabetic patients," BMC Ophthalmol. 2008 Jun 2;8:10. doi: 10.1186/1471-2415-8-10.
5. Herrero-Vanrell R, Peral A. [International Dry Eye Workshop (DEWS). Update of the disease]. Archivos de la Sociedad Espanola de Oftalmologia. 2007; 82(12):733-734.
6. Miljanovic B, Dana R, Sullivan DA, Schaumberg DA. Impact of dry eye syndrome on vision-related quality of life. Amer J Ophthalmol. 2007;143(3):409-15.
7. Alves Mde C, Carvalheira JB, Modulo CM, Rocha EM. Tear film and ocular surface changes in diabetes mellitus. Arquivos brasileiros de oftalmologia. 2008; 71(6 Suppl):96-103.
8. Lihteh Wu et al. Classification of diabetic retinopathy and diabetic macular edema;World J Diabetes. 2013 Dec 15;4(6):290–294.
9. Pradeep Pakalapati et al. Clinical Association Between Dry Eye and Diabetes Mellitus.Indian Journal Of Applied Research. 2015 June;5(6).
10. Ibtesam Nasimul Hasan et al. Assessment of dry eye status in type 2 diabetic patients in tertiary health care hospital, India.Journal of Dental and Medical Sciences. 2014 Aug;13(8 Ver. IV):06-11.
11. Tanushree V et al. Prevalence of Dry Eye in Type 2 Diabetes Mellitus. Int J Sci Stud 2014;2(8):119-123.
12. Ogundo C, Ilako D, Maina J. Prevalence of dry eye syndrome in diabetic patients attending Kenyatta National Hospital, Kenya. Journal of Ophthalmology of Eastern Central and Southern Africa. December 2015.
13. Seifart U, Strempel I. The dry eye and diabetes mellitus. Der Ophthalmologe. Zeitschrift der Deutschen Ophthalmologischen Gesellschaft. 1994; 91(2):235-9.
14. Miki Uchino et al. Prevalence and Risk Factors of Dry Eye Disease in Japan: Koumi Study. Ophthalmology. 2011 Dec;118(12):2361-7. doi: 10.1016/j.ophtha.2011.05.029.
15. Goebbles M. Tear secretion and tear film function in insulin dependent diabetics. Br J Ophthalmol 2000;84:19–21.
16. Moss SE, Klein R, Klein BE. Prevalence of and risk factors for dry eye syndrome. Arch Ophthalmol 2000;118:1264-8.
17. Sahai A, Malik P. Dry eye: Prevalence and attributable risk factors in a hospital-based population. Indian J Ophthalmol. 2005;53(2):87-91.
18. Ashok Garg, John D. Sheppard, Eric D Donnenfeld, David Meyer et al. editors Clinical Diagnosis And Management Of Dry Eye And Ocular Surface Disorgers, chapter 3 pages 49-50. chapter 5 pages 69-70.
19. Kaiserman I, Kaiserman N, Nakar S, Vinker S. Dry eye in diabetic patients. Am J Ophthalmol 2005;139: 498-503.
20. GilbardJP Human tear film electrolyte concentrations in health and dry-eye disease. IntOphthalmolClin. 1994;34:27-36.
21. Nichols KK et al. Frequency of dry eye diagnostic test procedures used in various modes of ophthalmic practice. Cornea. 2002;21:578-583.