

Original Research Article

Dry eye syndrome in patients of diabetes with and without diabetic retinopathy

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Received: 07 January 2018

Accepted: 03 February 2018

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ABSTRACT

Background: Diabetes Mellitus (DM) can lead to Diabetic retinopathy. Dry Eye Syndrome is commonly seen in diabetic patients. The purpose of this study was assessment of dry eye in patients with and without diabetic retinopathy.

Methods: The study was conducted in the department of Ophthalmology and Rural and Urban centres of Community Medicine, Narayan Medical College and Hospital, Sasaram, Bihar. All cases of Type 2 diabetes mellitus over six months period were considered for the study. The diabetic patients were divided into two groups, one with diabetic retinopathy and others without diabetic retinopathy. All patients were subjected to McMonnie's questionnaire and clinical evaluation including tear film studies like Schirmer's test and Tear Film Break Up Time (TBUT).

Results: 60 diabetic patients were enrolled for the study, 30 had evidence of diabetic retinopathy while 30 had no evidence. The most common dry eye symptom reported was foreign body sensation (96.7%). All Signs of dry eye disorder were found more commonly in patients with diabetic retinopathy as compared to those without diabetic retinopathy. Mcmonnie's scores correlates well with both Schirmer's basic secretion test (BST) and TBUT.

Conclusions: Dry eye syndrome must be diagnosed in diabetic patients. Periodic screening of diabetic patients should be carried out to evaluate diabetic retinopathy and its complications.

Keywords: Dry eye syndrome, Diabetic retinopathy, Schirmer's BST, TBUT

INTRODUCTION

Diabetes Mellitus (DM) is now one of the leading causes of disease related deaths globally. Currently it is estimated that nearly 70 million Indians are diabetic.¹ Dry Eye Syndrome (DES) or Keratoconjunctivitis Sicca (KCS) is one of the most common ophthalmic disorders associated with symptoms including ocular discomfort, pain, dryness and foreign body sensation, which can impair the quality of life of diabetic patients.² Diabetic retinopathy constitutes 4.8% of the global cause for blindness with high prevalence (ranging from 7.3% to 25%) in India. Diabetic retinopathy is a silent disease and

calls for early detection and timely intervention for its management is necessary.³ Dry Eye Syndrome is more prevalent in diabetic patients. Diabetic retinopathy and DES appear to have common association. In fact, examination for dry eye should be an integral part of the assessment of diabetic patients.⁴

The relationship and association between diabetic retinopathy and Dry eye syndrome is not well documented in India except few studies done in New Delhi and Jammu.^{5,6} So, keeping this in mind, the present study was done to assess dry eye syndrome in patients with and without diabetic retinopathy. We compared

symptoms and signs of dry eye syndrome in patients with and without retinopathy.

METHODS

The study was conducted in Narayan Medical College and Hospital, Sasaram, Bihar in the department of Ophthalmology and Community Medicine. All cases of Type 2 diabetes mellitus with age ≥ 35 years attending OPD of Rural and Urban centres of Department of Community Medicine over the period July 2017 to December 2017 were considered for the study. The study participants were divided into two distinct groups. First group consists of diabetic patients with clinical evidence of diabetic retinopathy and second group with no evidence of diabetic retinopathy. 30 patients were enrolled in each of the above two groups after written informed consent. Exclusion criteria for the study were any patient on medication which affect dry eye condition, any eye lid disease or abnormality, any ocular surface disorder, vitamin A deficiency, contact lens users, history of LASIK surgery, habit of smoking and eyes in which fundus examination was not possible. All patients were subjected to McMonnie's questionnaire and clinical evaluation including tear film studies.⁷ Presence and absence of diabetic retinopathy was confirmed by two ophthalmologists. For tear film evaluation, Tear film break up time (TBUT), Fluorescein staining and Schirmer basic secretion test (BST) were performed on patient as per standard guidelines.⁸

For statistical analysis, an average of values of two eyes was applied. TBUT of less than 10 seconds was considered abnormal. For BST, any value less than 10mm was taken as an indicator of dry eye. The data was analysed using SPSS 16.0. The qualitative variables were expressed as percentages. Descriptive and inferential statistics (Z test) were applied Where appropriate, Odds ratio (OR) with 95% confidence interval (CI) was also calculated. Chi square test were used and values of $p < 0.05$ was considered significant.

RESULTS

The mean age of the patients enrolled in this study was 54.03 ± 7.89 years, the minimum being 35 years and the maximum being 76 years. Out of the enrolled 60 diabetic patients, 26 (43.3%) were males and 34 (56.7%) were females. Out of 26 males, 11 (42.3%) had evidence of diabetic retinopathy while 15 (57.7%) had no evidence. Out of 34 females, 19 (58.9%) had diabetic retinopathy while 15 (41.1%) had no evidence of the same.

Several symptoms of dry eye syndrome were noted in patients and scored according to the McMonnie's Dry Eye Questionnaire (Table 1). The most common symptom reported was foreign body sensation (96.7%). Most of the symptoms of dry eye except itching was found significantly ($p < 0.005$) more common in patients with diabetic retinopathy as compared to patients without diabetic retinopathy.

Table 1: Symptoms of dry eye in patients with and without diabetic retinopathy.

Symptoms	Overall	With retinopathy	Without retinopathy	Z score	P value
	N (%)	n (%)	n (%)		
Foreign body sensation	58 (96.7)	30 (50%)	28 (46.7)	1.4384	0.149
Grittiness	41 (68.3)	28 (46.7)	13 (21.6)	4.1629	<0.05*
Burning sensation	27 (45.0)	19 (31.7)	8 (13.3)	2.8545	<0.05*
Itching	11 (18.3)	4 (6.7)	7 (11.6)	-1.0009	0.317
Dryness	45 (75.0)	27 (45.0)	18 (30.0)	2.6833	<0.05*
Effect of smoke, smog, ac etc.	13 (21.7)	9 (15.0)	4 (6.7)	1.5668	0.116
Feeling dry after alcohol intake	2 (3.3)	1 (1.7)	1 (1.6)	0	1
Joint pain	3 (5.0)	2 (3.3)	1 (1.7)	0.5923	0.555
Dryness of nose, mouth and throat	3 (5.0)	2 (3.3)	1 (1.7)	0.5923	0.555
Thyroid abnormality	4 (6.7)	3 (5.0)	1 (1.7)	1.0351	0.298
Sleep with eyes open	0 (0.0)	0 (0.0)	0 (0.0)	-	0
Eye irritation on walking	35 (58.3)	28 (46.7)	7 (11.6)	5.4991	<0.05*

*The result is significant

All Signs of dry eye disorder were found more commonly in patients with diabetic retinopathy as compared to those without diabetic retinopathy (Table 2). Most common sign of dry eye was conjunctival vascular tortuosity (50%), found significantly more in patients with diabetic retinopathy as compared to patients without diabetic retinopathy.

Out of 60 patients studied, 17 (28.3%) were diagnosed as having dry eye based on Schirmer's BST and 40 (66.7%) with dry eye based on TBUT (<10 seconds) (Table 3). Conjunctival Vascular Tortuosity was seen in 100% (17 out of 17) with dry eye diagnosed with Schirmer's BST and 70% (28 out of 40) with dry eye diagnosed by TBUT.

Table 2: Clinical signs of dry eye in patients with and without diabetic retinopathy.

Signs	Overall	With retinopathy	Without retinopathy	Z score	P value
	N (%)	n (%)	n (%)		
Conjunctival vascular tortuosity	30 (50.0)	22 (36.7)	8 (13.3)	3.6148	<0.05*
Normal corneal lusture decreased	17 (28.3)	15 (25.0)	2 (3.3)	3.7244	<0.05*
Fluorescein staining	9 (15.0)	7 (11.7)	2 (3.3)	1.8078	0.070

Table 3: Clinical signs of dry eye in patients with Schirmer’s <10mm and TBUT<10 secs.

Sign	Schirmer’s <10mm	TBUT<10 secs
	N=17 (28.3%)	N=40 (66.7%)
Conjunctival vascular tortuosity	17	28
Normal corneal lusture decreased	13	18
Fluorescein staining	6	9

Table 4: Abnormal Schirmer’s test (<10mm) and abnormal TBUT (<10 secs) in patients with and without diabetic retinopathy.

Tests	Overall	With retinopathy	Without retinopathy	Odd ratio	95% CI	P value
	N (%)	n (%)	n (%)			
Schirmer’s <10mm	17 (28.3%)	14 (23.3)	3 (5.0)	7.87	1.95-31.67	<0.05*
TBUT <10 secs	40 (66.7%)	25 (41.7)	15 (25.0)	5.00	1.50-16.56	<0.05*

Out of 17 patients with a Schirmer’s value <10mm, 14 (23.3%) had diabetic retinopathy while only 3 (5%) patients were without diabetic retinopathy. Patients with diabetic retinopathy had 7.87 times more chance of having Schirmer’s value <10mm than those without diabetic retinopathy. Out of 40 patients with TBUT<10 seconds, 25 (41.7%) had diabetic retinopathy and 15 (25%) patients were without diabetic retinopathy. Patients with diabetic retinopathy had 5 times more chance of having TBUT<10 seconds than those without diabetic retinopathy (Table 4).

A comparison of McMonnie’s symptom score and Schirmer’s test and TBUT was also done. It was observed that with increase in Mcmonnie’s symptoms score, dry eye severity based on Schirmer’s test and TBUT also increased and it was statistically significant (p<0.05) in both patients with and without diabetic retinopathy. McMonnie’s scores correlates well with both Schirmer’s test and TBUT.

DISCUSSION

Diabetes may lead to various ocular complications including dry eye syndrome or Keratoconjunctivitis Sicca (KCS). A study by Rahman et al showed that KCS is another manifestation of type 2 diabetes.⁹ The ocular surface disease in diabetes is characterized by disorder of

tear films which can be confirmed by multiple tear film tests like Schierner’s BST and TBUT.

The presence of various symptoms of dry eye syndrome was noted according to the McMonnie’s Dry Eye Questionnaire. Foreign body sensation was most common symptom while itching was least reported in present study. Also, most of the symptoms were more common in patients with diabetic retinopathy as compared to ones without diabetic retinopathy. Khurana et al found that all symptoms of dry eye, except itching were found to be higher in patients with diabetic retinopathy as compared to patients without diabetic retinopathy.⁵

Patients with diabetic retinopathy were found to have more corneal vascular tortuosity and decreased corneal lustre as compared to patients without diabetic retinopathy. Meibomian gland dysfunction is found more in diabetic patients, also seen by Lin X et al.¹⁰

TBUT and Schirmer’s BST values were lower in diabetic patients with diabetic retinopathy as compared to those without diabetic retinopathy. Dogru et al showed that diabetic patients with peripheral neuropathy and poor metabolic control have lower tear film tests values as compared to controls.¹¹ Ozdemir et al reported that abnormality of tear film tests are significantly associated with severity of diabetic retinopathy.¹²

Patients with diabetic retinopathy had a higher chance of having TBUT<10 seconds and Schirmers value<10mm than those without diabetic retinopathy. Dhar RH et al found that mean schirmer's value and mean TBUT in the patients with diabetic retinopathy was significantly lower as compared to those without diabetic retinopathy.⁶

Limitations of the research work was the glycemic parameter assessment especially HBA1C and duration of diabetes was not included in the study. Sample size and duration of study was small in the study thus the study does not necessary represent the result for entire population.

CONCLUSION

A detailed symptoms assessment by McMonnie's questionnaire can be done for dry eye screening of diabetic patients even in primary and secondary health care levels. Patients should be treated for these symptoms if they are affecting their day to day working. Tear film diagnostic tests like Schirmer's BST and TBUT should be considered for grading severity and choosing proper treatment options. Dry eye syndrome was positively correlated with the presence of diabetic retinopathy in this study. Any diabetic patient complaining of dry eye symptoms should be screened for diabetic retinopathy.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Sharma AK, Aslami AN, Kumar A, Kumar A, Priyadarshi R. Dry eye syndrome in patients of diabetes with and without diabetic retinopathy. Int J Res Med Sci 2018;6:794-7.