

Study to Find the Burden of Dry Eye in Diabetic Patients in a Tertiary Care Hospital

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ABSTRACT

Introduction: Dry eye refers to reduced tear production and/or excessive tear evaporation in the tear film of the eye and is often associated with symptoms of ocular discomfort. Dry eye disease is more commonly seen in people with type 2 diabetes. The objective of the present study is to find the burden of dry eye in diabetic patients.

Methodology: A hospital based observational study was conducted among the diabetic patients registered during October 2017 to September 2018 under Regional institute of Ophthalmology (RIO), RIMS, Ranchi. Purposive sampling was carried out and a total of 54 diabetic patients were interviewed. Logistic regression (LR) was used for statistical analysis.

Results and Conclusion: In the present study, total 54 diabetic patients were interviewed in which 31 (57.4%) had dry eye. Most of the study participant belonged to the age group of 41 - 60 years (51.9%); 55.6% (30) were female. 51.85% of the cases were having diabetic retinopathy. By applying LR the strength of association for dry eye was seen more in > 60 years of age group, having diabetes > 5 years and patients having diabetic retinopathy which were found to be statistically significant.

Keywords: Dry eye, Diabetes, Observational study

INTRODUCTION

Dry eye workshop 2007(DEWS) defined dry-eye syndrome as “a 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. It is accompanied by increased osmolarity of the tear film and inflammation of the ocular surface. ⁽¹⁾

It is due to reduced tear production and/or excessive tear evaporation associated with symptoms of ocular discomfort. ⁽²⁾ Symptoms of dry eye include pain, heaviness, foreign body sensation, grittiness, ocular fatigue, redness, burning, stinging, photophobia and reflex watering due to corneal irritation. ⁽³⁾

Previous study shows that dry eye has been associated with diabetes mellitus which was confirmed with Schirmer’s test. ⁽⁴⁻⁶⁾

Dry eye syndrome (DES) is also referred as Keratoconjunctivitis sicca, which is more commonly associated with diabetes mellitus (DM). Risk of DES is more prevalent in people who suffer from advanced stages of diabetic retinopathy. ⁽⁷⁾

Poor glycemic control affects both the anterior and the posterior segments of the eye and increasing the prevalence of diabetes-associated DES (DMDES). The risk of dry eye is related with the elevated levels of glycosylated hemoglobin: the higher the level the higher the incidence of dry eye. ⁽⁸⁾

Diabetic patients have a high risk for dry eye because they have chances of developing decreased corneal sensitivity, neuropathy involving innervations of lacrimal gland and loss of goblet cells. ⁽⁹⁾

Dry eye is recognised as a disturbance of the Lacrimal Functional Unit (LFU), an integrated system comprising the lacrimal gland, ocular surface (cornea, conjunctiva and Meibomian glands) and lids, and the sensory and motor nerves that connect them. This functional unit controls the major components of the tear film, transparency of cornea, and the quality of image projected onto the retina. ⁽⁴⁾

Several previous studies have investigated the relationship between diabetes and dry eyes. Although some found an increased risk for dry eyes among diabetic individuals, ⁽¹⁰⁻¹²⁾ others found neither a significant decrease in the amount of aqueous tear flow nor impaired tear breakup time among insulin-treated diabetic patients. ⁽¹³⁾

There are only three published reports on prevalence of dry eye among hospital based population from North and Eastern India and the prevalence varies between 18.4% and 40.8% (Gupta SK-2002, Sahai A-2005, Gupta N-2010, and Basak SK-2012). ⁽¹²⁻¹⁴⁾ One small study from high altitude showed a higher prevalence of 54% (Gupta N-2008). ⁽¹³⁾

Our study aims to find the burden of dry eye in diabetic patients and associated risk factors.

MATERIALS & METHODS

A hospital based observational study was conducted from October 2017 to September 2018 to determine the burden of dry eye in diabetic patients in Regional institute of Ophthalmology (RIO), RIMS, Ranchi by using a predesigned, pretested semi-structured questionnaire. All the patients getting registered in EYE OPD, RIO, RIMS, RANCHI from October 2017 to September 2018 and having diabetes mellitus (DM) were taken into consideration for evaluation of Dry Eye Syndrome. A total of 54 patients were selected during the study period. Purposive sampling was carried out.

The study protocol was approved by the Institutional Ethics Committee. Informed consent was collected from the

participants and confidentiality was assured. Patients who were not willing to give consent; not having DM; patients with pre-existing systemic disease like Sjogren's syndrome, connective tissue diseases (Rheumatoid arthritis, Wegener's granulomatosis, Polyarteritis nodosa, etc.) and patients on medications with Anti-histaminics, Anti-cholinergic group of drugs, Tricyclic Antidepressants, topical or systemic beta blockers, oral contraceptive pills, systemic or topical NSAIDS, long term Anti-glaucoma medications, post ocular surgery, ocular trauma which causes dry eye are specifically proven were excluded from the study.

All the patients selected for study have undergone routine investigations and were subjected to Dry Eye Questionnaire. Schirmer's test, Tear Break Up Time (TBUT) and Fluorescein staining was used to diagnose dry eye.

Diagnostic Tests

- For patients with mild irritation symptoms: a reduced tear breakup time (TBUT) may indicate an unstable tear film with normal aqueous tear production, and there may be minimal or no dye staining of the ocular surface (Pflugfelder SC-1998)[60].
- For patients with moderate to severe symptoms: the diagnosis can be made by using one or more of the following tests:
 - Tear break-up time (TBUT) test – to evaluate tear-film stability;
 - Ocular surface dye staining (Fluorescein/rose Bengal/Lissamine green) test: to evaluate ocular surface disease (KCS);
 - Schirmer's test: to evaluate aqueous tear production. These tests should be performed in this sequence because the Schirmer's test can disrupt tear film stability and cause false-positive ocular-surface dye staining.

The information collected was tabulated and analysed using standard statistical software (Microsoft Excel 2010 and SPSS Version 25).

Statistical Analysis: Logistic Regression was applied to find out the association and their strength between the variables to validate the findings of the study.

RESULT

In our study the prevalence of dry eye in the study subjects came out to be 57.4%.

Table – 1 shows the socio-demographic and clinical profile of study subjects who participated in the study. The age distribution revealed that maximum subjects 28 (51.9%) were in the age group of 41 - 60 years. Female cases contributed 55.6% of the study population while 44.4% were males. Most of them (40.7%) had history of duration of diabetes of 1- 5 year. More than one third of the study population that is 38.9% were having hypertension. Almost half (51.7%) of the study subjects had diabetic retinopathy.

Figure 1 represents the clinical features of the participants in the study. The most common complaints were redness of eye, burning sensation, painful eye, blurring of vision and problem in low humid areas.

By applying logistic regression, we saw that in the age group > 60 years have

6.5 times more chance of having dry eye as compared to participants in age group <40 years. Study participants having diabetic retinopathy had a risk of developing dry eye 54 times as participants not having diabetic retinopathy. Study participants having diabetes > 5 years had 5 times greater risk for dry eye as compared to newly diagnosed diabetics (<1 year).

Table 1: Profile of Study participants

Variable	Frequency	Percentage
Age		
< 40	9	16.7
41 – 60	28	51.9
>60	17	31.5
Gender		
Female	30	55.6
Male	24	44.4
Occupation		
Housewife	19	35.2
Farmer	22	40.7
Office Worker	7	13.0
Field Worker	6	11.1
Hypertension		
Absent	33	61.1
Present	21	38.9
Dry Eye		
Absent	23	42.6
Present	31	57.4
DM duration		
< 1 year	16	29.6
1 – 5 year	22	40.7
> 5 year	16	29.6
Diabetic Retinopathy		
Present	28	51.85
Absent	26	48.15

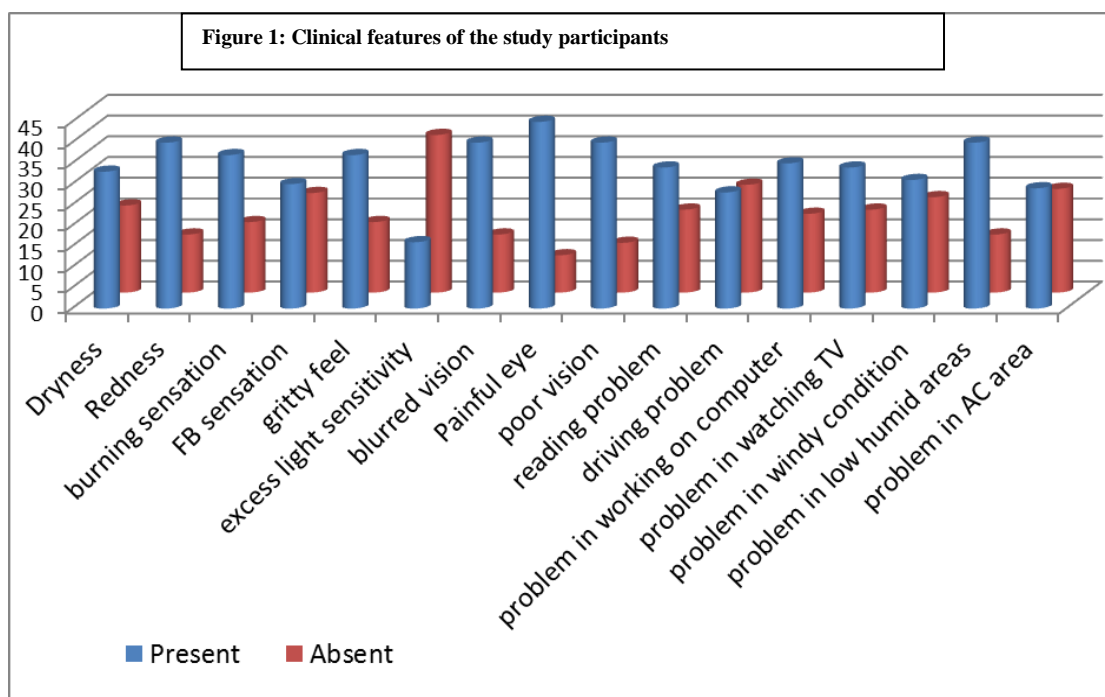


Table 2: Risk of dry eye in Diabetic patients by applying logistic regression

Variables	Dry Eye		Odds Ratio	p-value
	Present	Absent		
Age				
< 40	3	6	-	-
41 – 60	15	13	2.31	0.29
>60	13	4	6.5	0.03*
Gender				
Female	11	19	-	-
Male	20	4	8.63	<0.001*
Diabetic Retinopathy				
Present	26	2	54.6	<0.001*
Absent	5	21	-	-
Duration of DM				
< 1 year	6	10	-	-
1 – 5 year	13	9	2.4	0.19
> 5 year	12	4	5	0.03*

* – statistically significant

DISCUSSION

The present study entitled “Study to find the burden of dry eye in diabetic patients in a tertiary care hospital” was planned to find out the burden of dry eye in diabetic patients in Eye OPD.

In our study the burden of dry eye in the study participants was 57.4% which was similar to the findings of Nepp et al, (15) Seifart and Stempel (3) and Home and De Land (16,17)

The findings of our study is similar to the study conducted by Moss et al (18) and Yazdani et al (19) which revealed association of dry eye with increasing age.

Male diabetic patients had 8.6 times higher risk of developing dry eye than female diabetic patients.

Most common clinical features among our study participants were redness of eye, burning sensation, painful eye, blurring of vision and problem in low humid areas. Other studies conducted also had similar complaints of gritty sensation, decreased visual acuity, photophobia, itching, decreased corneal sensitivity, tearing and pain concomitant with abnormalities in TUBUT, Schirmer's test, and corneal staining. More severe cases may be complicated by corneal lesions, conjunctivitis, keratopathy, and inflammation (17) and Manaviat et al. (11)

In addition, Nepp et al. (15) revealed that the severity of dry symptoms correlated with the severity of diabetic retinopathy. Diabetic subjects have structured metabolic

and functional abnormalities of the cornea and are at a high risk of developing corneal lesions, as reported in several experimental and clinical studies. (20-23)

In our study the risk of dry was 6.5 times in the age group > 60 years; 54 times for participants having diabetic retinopathy and 5 times in study participants having diabetes > 5 years.

Secondary prevention i.e., early diagnosis and treatment of dry eye is essential to avoid complications. Till date there is no fixed protocol for treatment of DES. Predominately application of artificial tears, including surfactants and various viscous agents are used for symptomatic management. (24) Artificial tears temporarily improve blurred vision and other symptoms.

Corticosteroids, NSAIDs, cyclosporin A, tacrolimus, autologous blood serum, and several new drugs are undergoing clinical trials for management of DES. (25,26) Role of topical corticosteroids is to reduce the signs, symptoms, and inflammation in dry eyes and prevent corneal epithelial damage. (27) Its use help in improvement of ocular surface disease index score and dendritic cell density significantly. (28) Corticosteroids acts by suppressing cellular infiltration and increasing synthesis of lipocortin which in turn block phosphorylation of phospholipase A2, which is the key step of the inflammatory cascade (26,29) However, side effects such as bacterial and fungal infections, increase in intraocular pressure,

and cataracts have been reported. ⁽³⁰⁾ Thus application of lower concentration of topical steroid drugs for short duration (one or two weeks) is recommended for those patients with DMDES.

CONCLUSION

DM is a risk factor for DES and corneal epithelial abnormalities. It causes epithelial barrier dysfunction which result in corneal complications and then LFU dysfunction. The corneal complication caused by high blood sugar includes superficial punctate keratopathy, trophic ulcers, persistent epithelial defects, and recurrent corneal erosions.

Our study revealed the risk of dry eye in diabetic patients was 6.5 times in the age group > 60 years; 54 times for participants having diabetic retinopathy and 5 times in study participants having diabetes > 5 years.

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