



Prevalence of Dry Eye Disease in Diabetic Population in Patients Attending a Tertiary Care Centre in Kashmir, India

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Abstract

Aim: To study the prevalence of dry eye disease in diabetic population in patients attending a tertiary care centre.

Background: Dry eye disease in diabetic population is one of the most neglected disorders as particular focus is laid on diabetic retinopathy. There are various factors related to the pathogenesis of dry eye disease in diabetics and one of the factors i.e., accumulation of sorbitol has been postulated to cause structural changes in lacrimal glands and hence affecting the secretion of tears and causing dry eye disease.

Materials and methods: A cross sectional study was carried out in 300 patients of type 2 diabetes over a period of six months from May 2021 to October 2021 as per inclusion and exclusion criteria in the out patient department of Ophthalmology in our hospital. Schirmer's Test and TBUT (tear film breakup time) was carried out in all patients to evaluate the tear film status.

Results: Among the 300 patients included in the study, 143 (48.3%) were having dry eye which included 53.7% males and 44% females. 55% patients belonged to the age group 50-60 years, 53.9% were of the age ≤ 50 and the rest 28.6% were >60 years. 45% had mild dry eye, 30% had moderate and 25% had severe dry eye disease. Patients with duration of diabetes ≤ 10 years, 51% had dry eyes and among patients with duration >10 years 42.9% had dry eyes.

Conclusion: Diabetes has a deleterious effect on both anterior as well as posterior segments of the eye and an increasing prevalence of diabetes associated dry eye has been seen in recent times. So early detection of the disease is indicated to save patients from the harmful effects.

Keywords: dry eye disease, diabetics, Schirmer's test, tear film breakup time(TBUT).

Introduction

According to the International Diabetes Federation (IDF), the diabetic population in India is 65.1 million and the number is increasing rapidly due to the unhealthy lifestyle of majority of population[1]. The common ocular problems arising from diabetes are refractive errors, nerve palsies, glaucoma, diabetic retinopathy, cataract and diabetic macular edema[2]. The study of dry eye disease is important especially in diabetics as it predisposes them to various morbidities such as deficit in vision, corneal

opacities, corneal perforation and various secondary bacterial infections[3]. The corneal complications caused by hyperglycemia include superficial punctate keratopathy, trophic ulcers, persistent epithelial defects, and recurrent corneal erosions and all these are associated with DES[4]. Dry eye disease etiopathogenesis in diabetic individuals may be explained in terms of relationship to peripheral neuropathy secondary to hyperglycemia, insulin insufficiency, inflammation, autonomic dysfunction,

and altered aldose reductase activity[5,6].The incidence of dry eye is correlated with the level of HbA1C, the higher the levels, the higher is the incidence of dry eye[7].

Methods

A cross sectional study was carried out in 300 patients. Ethical clearance for this study was taken from the institutional ethical committee. Patients were enrolled in the study after obtaining written informed consent. Individuals with type 2 diabetes who went to OPD were included in the study as per inclusion and exclusion criteria.

Inclusion Criteria:

1. Patients with type 2 diabetes of any duration and age >40 years.

Exclusion Criteria:

1. Patients with any systemic disease other than diabetes;
2. Local ocular disorders or surface abnormalities as assessed by history and clinical examination which are known to cause dry eye;
3. Patients on anti-glaucoma medication or any other medications known to cause dry eye;
4. Patients who have undergone any ocular surgery;
5. Collagen diseases like rheumatoid arthritis;
6. Chronic contact lens wearers, patients on local or systemic medications known to cause dry eyes

A detailed clinical history regarding diabetes such as type of diabetes, duration of disease, type of treatment was taken. A brief general physical examination was carried out. Ocular examination included recording Snellen’s visual acuity. Detailed

Results and Observations

anterior segment examination was done under slit lamp. Condition of lids, conjunctiva and corneal surface were noted. Detailed fundus examination was carried out using indirect ophthalmoscopy.

Dry eye disease was diagnosed with the help of slit-lamp examination, Schirmer’s test, tear film break-up time (TBUT).

Tear film evaluation was done by recording the tear meniscus height, presence of debris with the help of slit lamp.

Dry eye disease grading was done by the following standard protocol:

Measurements of ≤10 mm of tear meniscus were considered to be positive. Readings >10 mm were considered as negative.

TBUT of ≤10 s was considered as positive indicative of dry eye and >10 s was considered as negative.

Dry eye was graded into three categories as mild, moderate and severe. Mild dry eye was defined in patients who have a Schirmer’s test of 6–10 mm in 5 min.

Moderate dry eye was defined as a Schirmer’s test of 3–5 mm in 5 min.

Severe dry eye was defined as a Schirmer’s test of ≤2 mm in 5 min.

Statistical analysis of the data was done using the SPSS software version 20. Continuous variables were expressed as mean and standard deviation. Chi-square test and Fisher’s exact test were used for testing the significance of differences between proportions and association between various variables. A ‘P’ value of less than 0.05 was taken as statistically significant.

Table 1: Association of dry eye with age, gender, duration and diabetic retinopathy

Variables	Number of patients(n=300)	Dry eye n=145(48.3%)	Significance of chi-square	P value
Age				
≤50	130	70 (53.9)		

50-60	100	55(55)	14.309	0.001
>60	70	20(28.6)		
Gender				
Male	134	72(53.7)	2.826	0.093
Female	166	73(44)		
Duration				
≤10 years	188	97(51.6)	2.146	0.143
>10 years	112	48(42.9)		
Diabetic retinopathy				
Absent	210	101(48.1)	0.016	0.900
Present	90	44(48.9)		

From Table 1, we can see that the relationship of dry eye with age is statistically significant. Among 130 patients with age ≤ 50 years 70 patients i.e., 53.9% were associated with dry eye. In 100 patients falling in the age group 50 to 60 years, 55% were having dry eye and with patients having >60 years age, 28.6% had dry eye.

Among 134 male patients, 72 (53.7%) had dry eyes and among 166 female patients, 73(44%) had dry eyes.

Among 188 patients with duration of diabetes ≤ 10 years, 97(51%) had dry eyes and among 112 patients with duration >10 years ,48(42.9%) had dry eyes.

Among 90 patients with diabetic retinopathy, 44(48%) were having dry eye disease.

TABLE 2 :Distribution of the type 2 diabetes patients according to their dry eye characteristics (n=145)

Dry eye	No. of patients (%)
Mild	65(45%)
Moderate	43(30%)
Severe	37(25%)

Table 2 reveals that among 145 diabetic patients having dry eye disease, 45% had mild dry eye, 30% had moderate and 25% had severe dry eye disease.

Table 3 : Distribution of the type 2 diabetes patients according to their visual acuity (Snellen's)(n=300)

Vision (Snellen's)	Right eye no. (%)	Left eye no. (%)
6/6–6/18	117	99
6/24–6/60	120	120
5/60–3/60	30	33
2/60–1/60	15	30
<1/60–perception of light (PL)	18	18
Total	300	300

Table 3 shows the Snellen's visual acuity in both the eyes of all subjects included in the study.

Discussion

Dry eye disease (DED) is a common disorder in general population consisting of 28% of the patients[8]. It has become an important manifestation in diabetic population. In our study the percentage of diabetic patients with dry eye symptoms consisted of 48.3% which is in consistence with a study conducted by Sarkar KC et al [9], Nepp et al [10]. In our study among the patients with dry eye 53.7% were males and 44% were females and there was no statistically significant association with gender which is

comparable to the study conducted by Sarkar KC et al [9] Some researchers [11,12,13,14] have found that the incidence of dry eye increases in women with the possible explanation being the lower levels of protector androgens.

In our study we found statistically significant relationship of dry eye disease with age. 55% patients belonged to the age group 50-60 years, 53.9% were of the age ≤ 50 and the rest 28.6% were >60 years which is almost similar with a study done by Kaiserman et al[13]. Most of the studies have found

an increase in dry eye symptoms with increasing age[9]. Schultz et al suggested that the tear film osmolarity changes, increased evaporation and autonomic dysfunction as some of the reasons for increased prevalence in older population [15].

In our study , 45% had mild dry eye, 30% had moderate and 25% had severe dry eye disease. This finding was consistent with studies done by Hasan et al[16] and Sarkar KC et al [9].

Among 188 patients with duration of diabetes ≤ 10 years, 97(51%) had dry eyes and among 112 patients with duration >10 years, 48(42.9%) had dry eyes. These findings are not consistent with other studies which suggest that with increase in duration of diabetes, there is an increase in dry eye prevalence [15,17,18].

Conclusion

Poor glycemic control is deleterious for both the anterior as well as the posterior segments of the eye and an increasing prevalence of diabetes associated dry eye has been seen in recent times. Although some of the results from our study and other similar studies remain disputable, they all suggest that the diabetic patients are more susceptible to suffering from dry eye disease than normal population and timely checkup of diabetics is crucial for early diagnosis and treatment of these ocular surface disorders.

References

1. Xu Y. Prevalence and control of diabetes in Chinese adults. *The Journal of the American Medical Association*. 2013;310(9):948–959. doi: 10.1001/jama.2013.168118. [PubMed] [CrossRef] [Google Scholar]
2. Hom MM. 12th Annual Diabetes Report: Diabetes and Dry Eye-The Forgotten Connection. *Review of Optometry*; 2010. Available from: http://www.revoptom.com/continuing_education/tabviewtest/lessoned/106952. [Last accessed on 2015 Aug 23]
3. Riordan-Eva , Asbury T, Whitcher JP: Vaughan and Asbury’s general ophthalmology. 16th ed. USA, McGraw-Hill Medical; 2003:308-310.
4. “Vaughan and Asbury’s general ophthalmology, 17th edition,” *Clinical and Experimental Optometry*, vol. 91, no. 6, pp. 577–577, 2008.

5. Ramos-Remus C, Suarez-Almazor M, Russell AS. Low tear production in patients with diabetes mellitus is not due to Sjögren’s syndrome. *Clin Exp Rheumatol* 1994;12:375-80.
6. Fujishima H, Shimazaki J, Yagi Y, Tsubota K. Improvement of corneal sensation and tear dynamics in diabetic patients by oral aldose reductase inhibitor, ONO-2235: A preliminary study. *Cornea* 1996;15:368-75.
7. U. Seifart and I. Stempel, “The dry eye and diabetes mellitus,” *Ophthalmologie*, vol. 91, no. 2, pp. 235–239, 1994.
8. Goebbels M. Tear secretion and tear film function in insulin dependent diabetics. *Br J Ophthalmol* 2000;84:19-21.
9. Sarkar KC, Bhattacharyya S, Sarkar P, Maitra A, Mandal R. An Observational Study on the Prevalence of Dry Eyes in Type 2 Diabetes Mellitus Patients and its Relation to the Duration and Severity of Disease. *J Med Sci Health* 2021;7(1):68-72.
10. Nepp J, Abela C, Polzer I, Derbolav A, Wedrich A. Is there a correlation between the severity of diabetic retinopathy and keratoconjunctivitis sicca? *Cornea* 2000;19:487-91.
11. Sendacka M, Baryluk A, Polz-Dacewicz M. [Prevalence of and risk factors for dry eye syndrome]. *Przegl Epidemiol*. 2004, 58(1):227-33. Polish
12. Moss SE, Klein R, Klein BE. Incidence of dry eye in an older population. *Arch Ophthalmol*. 2004; 122(3):369-73.
13. Kaiserman I, Kaiserman N, Nakar S, Vinker S. Dry eye in diabetic patients. *Am J Ophthalmol*. 2005;139(3):498-503.
14. Schaumberg DA, Dana R, Buring JE, Sullivan DA. Prevalence of dry eye disease among US men: estimates from the Physicians’ Health Studies. *Arch Ophthalmol*. 2009;127(6):763-8.
15. Schultz RO, Van Horn DL, Peters MA, Klewin KM, Schutten WH. Diabetic keratopathy. *Trans Am Ophthalmol Soc* 1981;79:180-99.
16. Hasan IN, Aggarwal P, Gurav A, Patel N. Assessment of dry eye status in type 2 diabetic

- patients in tertiary health care hospital, India. Int Organ Sci Res J Dent Med Sci 2014;13:6-11.
17. Tanushree V, Madhusudhan CN, Hemalatha K, Gowda HT, Acharya AA, Patil S, *et al*. Prevalence of dry eye in type 2 diabetes mellitus. Int J Sci Stud 2014;2:119-23.
18. Burda N, Mema V, Mahmudi E, Selimi B, Zhugli S, Lenajni B, *et al*. Prevalence of dry eye syndrome at patients with diabetes melitus TIP 2. J Acute Dis 2013;2:48-5