

A Study of the Prevalence of Dry Eye in Type 2 Diabetes Patients and Correlation with Severity and Duration of Diabetes

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ABSTRACT

Background: To find the prevalence of dry eye in type 2 diabetes patients and correlate with severity and duration of diabetes.

Material and Method: 200 patients of type 2 diabetes mellitus attending OPD in B.L.D.E.U'S Shri B.M.Patil Medical College, Hospital and Research centre, Bijapur were consecutively selected. The study was conducted during the period from April 2013 to December 2013.

Clinical data of all patients which included sex, age, duration of diabetes as well as a history of other diseases, were obtained by reviewing the medical records and direct patient interview.

All patients were subjected to various tests to detect dry eye in diabetic patients. These included:

1. Schimer's test
2. Tear film break up time (tbut)
3. Lissamine green test
4. Blood investigations -
 - Random blood sugars/ fasting and post prandial blood sugars
 - Hba1c levels.

Results: In this study 200 diabetic patients were assessed. Of 200 patients, 71 were male and 129 were female. Out of them, 87 patients (43.5%) had dry eye syndrome, with prevalence among males 30 (42.25%) and females 57 (44.10%). The age of diabetic patients ranged from 40 years to more than 70 years. And the highest prevalence of dry eye was noted in the age group of 60-70 years. The incidence of dry eye increased with increase in duration of diabetes which showed 60% in patients with duration of diabetes of more than 20 years. The diabetic retinopathy changes (ETDRS Classification) increased with the chronicity of the diabetes.

Conclusion: This study highlights the fact that examination for dry eye should be an integral part of the assessment of diabetic patients as there is a direct relation between the age of the patient, Dry Eye, prevalence and severity of DR with duration/chronicity of Diabetes.

Keywords: Dry Eye, Diabetes, Schirmer's test, TFBUT

INTRODUCTION

Diabetes is one of the most common leading causes of blindness in 20-74-year old persons.^[1] Cataract and retinopathy are well-known as ocular complications of diabetes. Recently, problems involving the ocular

surface, dry eyes in particular, have been reported in diabetic patients.^[1]

The national eye institute / industry workshop of clinical trials in dry eye defined dry eye as 'The disorder of tear film due to tear deficiency or excessive

tear evaporation which causes damage to the interpalpebral ocular surface and is associated with symptoms of ocular discomfort.^{2,3}

It is a chronic, multifactorial condition characterised by disturbances in the tear film & ocular surface⁴. The features range from irritation and intermittently blurring of vision to sight threatening complications such as ocular surface keratinisation, corneal dellen, scarring, vascularisation; microbial or sterile corneal ulceration with possible perforation and severe visual loss⁵. Clinical evaluation is the key component for diagnosis of dry eye⁴.

The World health organisation (WHO) estimates prevalence of Diabetes worldwide currently is 220 million. India is known as capital of diabetes with prevalence of 9% as of 2011 stated by International diabetes federation⁷. Diabetes is one of the most common leading causes of blindness. Recently problems involving the ocular surface, dry eyes in particular have been reported in diabetic patients⁶. Diabetic patients have lower values of tear secretion and lower values of tear break up time test (TBUT) than normal subjects⁶.

Dry eye can lead to vision deficit, scarring and perforation of the cornea and secondary bacterial infection. If this syndrome is diagnosed at first stage and treated, would be protected from its complications. Therefore early diagnosis of dry eye syndrome in diabetic patients is important for beginning of treatment in early stages. Nevertheless studies to evaluate the prevalence of dry eye syndrome in type 2 diabetic patients are lacking. Therefore, we evaluated prevalence of dry eye syndrome in type 2 diabetic patients.

The most common dry eye symptoms reported by patients with diabetes are burning and foreign body sensation.^{9,10} Additional associated dry eye findings include tear film instability, a higher grade of conjunctival squamous metaplasia, lower goblet cell density, reduced corneal sensation and a reduced lipid layer of the tear film.⁹ Evidence even suggests a link between a family history of diabetes and symptoms of dryness.¹⁰ There are several theories that might explain the connection between dry eye and diabetes. The most frequently cited associated factors include peripheral neuropathy secondary to hyperglycemia, insulin insufficiency and inflammation.

MATERIALS AND METHOD

200 patients of type 2 diabetes mellitus attending OPD in B.L.D.E.U'S Shri B.M.Patil Medical College, Hospital and Research centre, Bijapur were consecutively selected. The study was conducted during the period from April 2013 to December 2013.

Clinical data of all patients which included sex, age, duration of diabetes as well as a history of other diseases, were obtained by reviewing the medical records and direct patient interview.

All patients were subjected to various tests to detect dry eye in diabetic patients. These included:

1. Schimer's Test
2. Tear Film Break Up Time (Tbut)
3. Lissamine Green Test
4. Blood Investigations –
 - Random Blood Sugars/ Fasting And Post Prandial Blood Sugars
 - HbA1C LEVELS.

The condition was confirmed by ocular surface dye staining pattern with fluorescein, tear film break up time (TBUT) (value 10s) and Schirmer test (value 5 mm in 5 min), according to American Academy of Ophthalmology by a specialist [11]. Diagnosis was established by positivity one or more of the tests (TBUT or Schirmer test). Structures of the eye were assessed with slit lamp biomicroscopy examination. Retinal status was evaluated by indirect ophthalmoscopy after dilation by Tropicamide drop. Diabetic retinopathy was graded according to early Treatment Diabetic Retinopathy (ETDRS) criteria [12].

Inclusion Criteria were

- Patients diagnosed with type 2 Diabetes Mellitus

Exclusion Criteria

- History of mucoid or watery discharge suggestive of keratoconjunctivitis, conjunctivitis.
- Impaired eye lid function like Bell's palsy, ectropion
- Contact lens users

- Patients who have undergone ocular surgery in last 6 months
- Patients with systemic infections like HIV, HTLV
- Trachoma
- Patients on treatment with α blockers, Anti depressants, Antihistaminics, Diuretics, Systemic retinoids.

Informed consent was obtained from all subjects and the research had the approval of the institutional review board and ethics committee.

Statistical analysis was done using

1. Mean \pm SD
2. Statistical tests like 't' and X^2 tests.

RESULTS

In this study 200 diabetic patients were assessed. Of 200 subjects, 71 were male and 129 were female. Out of 200 diabetics, 87 patients (43.5%) had dry eye syndrome, with prevalence among males 30 (42.25%) and females 57 (44.10%). Shown in Table 1. In our study there was no significant association of dry eye among both sex, with $P > 0.05$.

Table 1: Relative prevalence of Dry Eye Syndrome in both sexes.

Sex	Number of Pts. from Study Population	Dry Eye Syndrome	
Male	71	30	42.25%
Female	129	57	44.10%
Total	200	87	43.5%

Table 2 reveals that though the total number of patients in our study group were highest in the age group of 40 to 50 years (86) as well as the total number of affected patients (37), the relative high prevalence of dry eye syndrome was noted in the patient age group between 60 to 70 years (18 out of 36, i.e. 50%). Our study showed no significant association with different age groups.

Table 2: Prevalence of Dry Eye Syndrome within age groups

Age Group	No. of Pts from Study Population	Dry Eye Syndrome	Prevalence
40-50Yrs	86	37	43%
50-60Yrs	72	30	42%
60-70Yrs	36	18	50%
>70Yrs	6	2	33%

Table 3 confirms that with patients having diabetes for more than 20 years can expect to have more chances of affection by Dry Eye Syndrome. Patients with diabetes for more than 20 years have high prevalence of Dry Eye Syndrome, with significant P value ($p=0.0001$).

Table 3: Prevalence of Dry Eye Syndrome with duration of Diabetes.

Duration of DM	No. of pts from Study population	No. of pts. With Dry Eye Syn.	Relative frequency
0-5Yrs	66	15	22.72%
5-10Yrs	70	20	28.57%
10-15Yrs	30	22	73.33%
15-20 and above Yrs	34	30	88.23%

Table 4 In the same study population, we have looked for the presence of Diabetic Retinopathy (NPDR & PDR) changes. Table 4 shows the prevalence of Diabetic Retinopathy (NPDR in all forms and PDR) among the subject population ETDRS classification.

Table 4: Severity of NPDR and PDR with chronicity of DM.

Duration of DM	No. of	Mild NPDR	Moderate NPDR	Severe NPDR	Total affected by NPDR	PDR
0-10Yrs	136	44(32.35)	28(20.6%)	21(15.4%)	93(63.26%)	3(2.20)
10-20Yrs	44	8(18%)	10(23%)	10(23%)	28(63.7%)	2(4.5%)
>20Yrs	20	3(15%)	4(20%)	10(50%)	17(85%)	4(20%)
Total	200	55	42	41	138	9

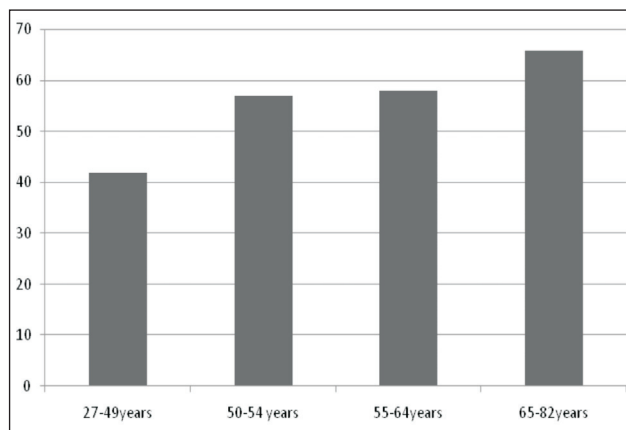
The total affected patients were 147 of them, which makes it a prevalence of 73.5%. The Non-Proliferative Diabetic Retinopathy patients were 138 (69%) while the Proliferative Diabetic retinopathy were 9(4.5%). We also observe that as the duration of diabetes increases, so does the severity of NPDR type. Severity of NPDR and PDR with chronicity of DM with significant P value (p=0.0129).

DISCUSSION

Our study included 200 diabetics, among which 87 patients (43.5%) showed dry eye disorder, with prevalence among males 30 (42.25%) and females 57 (44.10%).

In a study done by Manaviat M R et al out of 199 subjects, 108 patients (54.3%) had dry eye syndrome which 69(58%) were female and 39(48.8%) were male. Comparison of age-specific data on the prevalence of dry eye from large epidemiological studies reveals a range of about 5% to over 35% at various ages. However, it must be noted that different definitions of dry eye were employed in these studies, and, therefore, caution is advised in interpreting direct comparisons of these studies¹³.

In a study done by Manaviat M R et al the following graph shows the distribution of dry eye with age specific groups.

**Graph 1**

But there was not a significant association between sex and frequency of dry eye syndrome ($P = 0.2$) in the above study. Graph 1 shows frequency of dry eye syndrome in 65–85 year old group was highest(66.7%) and in 27–41- year old group was lowest, but this correlation was not significant($P = .9$)

Of 108 patients with dry eye syndrome the mean duration of diabetes was 11.48 ± 7.4 years whereas this was 9 ± 6.5 years in subjects without dry eye syndrome. A significant association was observed between duration of diabetes and frequency of dry eye syndrome ($P = .01$). Dry eye syndrome was significantly higher in subjects with DR (59.3%) ($p = .02$) in the above study.

According to the report of the Epidemiology Subcommittee of the International Dry Eye Workshop (2007)¹ dry eye rates increased with age, reaching the highest among women 75-79 years of age and men 80-84 years of age. The total number of patients in our study group were highest in the age group of 40 to 50 years (86) as well as the total number of affected patients (37), the relative high prevalence of dry eye syndrome was noted in the patient age group between 60 to 70 years (18 out of 36, i.e. 50%) This correlates with the report except that our mean age group with highest prevalence is between 60-70 years.

The correlation between the duration/chronicity of Diabetes mellitus with all of its known complications and there severity is a well established norm. The Manaviat MR . etal¹⁴. group have showed that there is a significant association between duration of diabetes and frequency of dry eye syndrome ($P = .01$). This rule holds good in our study also, as we see that there is an increase in prevalence of the Dry Eye Syndrome with the duration of the Diabetes. Patients with diabetes for more than 20 years have a 60% prevalence of Dry Eye Syndrome, much higher than those with less than 10 years and 10 to 20 years of diabetes.

It is a known fact that the incidence of Diabetic retinopathy increases with the duration of diabetes. The same is again matched with our population study

which shows the increase in prevalence with increasing chronicity (Table 4). The American Association of Diabetes, in its Diabetes Care chapter has detailed the relation between the two¹⁵. The Madras Diabetes Research foundation, in its recent report on the Indian Perspective¹⁶ has observed the prevalence of Diabetic Retinopathy to be about 34.1%, with 31% being of the NPDR type and 3.1% of PDR variant.

The duration of diabetes is probably the strongest predictor for development and progression of retinopathy. In India, virtually all studies have shown an increased prevalence of DR as the duration of diabetes increased.¹⁶ Our study re-affirms this established norm, the severity of the DR increases with chronicity of Diabetes.

CONCLUSION

This study highlights the fact that examination for dry eye should be an integral part of the assessment of diabetic patients as there is a direct relation between the age of the patient, Dry Eye, prevalence and severity of DR with duration/chronicity of Diabetes.

We understand that this study needs to gather data from a bigger study population to validate its results and also needs comparison with age matched control groups.

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