DRY EYE IN TYPE 2 DIABETICS

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ABSTRACT: AIM: This study was performed to assess the prevalence of dry eye in type 2 diabetic patients, to co-relate the same with type of diabetic retinopathy (DR) and glycosylated hemoglobin levels. **METHODS:** 398 type 2 diabetic patients referred to Diabetes clinic were consecutively selected. All were taken detailed history pertaining to dry eye, other diseases and drugs. All were subjected to dry eye questionnaire using ocular surface disease index (OSDI), detailed slit lamp evaluation to note those with tear break up time (TBUT) of less than 10 seconds, corneal and conjunctival staining with lissamine stain score by oxford system and Schirmer's I test when less than five millimeter in five minutes at least in one eye. All the subjects underwent glycosylated hemoglobin (HbA_{1c}) estimation, indirect ophthalmoscopy and retinal color photography using Topcon TRC 50DX. DR was graded according to early Treatment Diabetic Retinopathy (ETDRS) criteria. **RESULTS:** Of 398 subjects, 160(40.2%) were men and 238(59.8%) were women. Average age of the patients was 54.2 years (range, 27-81years). Out of 398 patients, 280(70.35%) patients had diabetic retinopathy (DR) and 216 (54.3%) patients had dry eye (p value-<0.01). Dry eye was more common in patients beyond 55 years (p-value <0.001) and females (p-value <0.1). The association between dry eye and diabetic retinopathy showed, out of 216, 38.2% (26 of 68) was the dry eye prevalence in mild non proliferative diabetic retinopathy (NPDR) while, 90.9% and 96% respectively were the prevalence of dry eye in severe NPDR and PDR patients (p-value <0.001). **CONCLUSION:** The prevalence of dry eye in diabetics was 54.3% and has significant association with severe DR and glycosylated hemoglobin. Hence, examination for dry eye should be an integral part of the assessment of diabetic eye disease.

KEY WORDS: Dry eye, Diabetes mellitus, Diabetic retinopathy Glycosylated hemoglobin,

INTRODUCTION: "Dry eye is 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⁾ Prevalence of dry eyes in diabetic patients has been reported. ⁽²⁾ These patients suffer from a variety of corneal complications including superficial punctate keratopathy, persistent epithelial defect and trophic ulceration; may lead to vision deficit. Early diagnosis and treatment would avoid vision threatening complications. ⁽³⁾ Hence, a study was done to evaluate

the prevalence of dry eye in type 2 diabetic patients and also to co-relate with glycosylated hemoglobin levels.

METHODS: At diabetes clinic, 398 patients with type 2 diabetes mellitus, including new and review cases of diabetes (was diagnosed according to ADA criteria) ⁽²⁾ were consecutively selected. Clinical data of all patients which included demography, duration of diabetes and history of other diseases and drugs were obtained. Exclusion criteria included cigarette smoking, contact lens, Lasik surgery, allergies, Sjogren's , Rheumatoid arthritis, vitamin A deficiency, pregnancy, Parkinson's disease , systemic lupus erythematosus, secondary diabetes, medications such as antihistamines, tricyclic antidepressants, oral contraceptives, anti hypertensive agents and diuretics. All were subjected to dry eye questionnaire using ocular surface disease index (OSDI) ⁽⁴⁾, detailed slit lamp evaluation to note those with tear break up time (TBUT) of less than 10 seconds ⁽⁵⁾ , corneal and conjunctival staining with lissamine stain score by oxford system and Schirmer's I test when less than five millimeter in five minutes at least in one eye. ⁽⁶⁾ Diabetic retinopathy was evaluated by indirect ophthalmoscopy and retinal color photography and graded according to early Treatment Diabetic Retinopathy (ETDRS) criteria. ⁽⁷⁾ Glycosylated hemoglobin levels were recorded. Informed consent was obtained from all subjects and the research had the approval of the institutional ethics committee.

RESULT: This study included 398 diabetic patients out of which 216 (54.3%) were positive for dry eye had a p value of <0.01. (Table -1)

Table-1. Dry eye prevalence in diabetes mellitus

No. of patients	No of dry eyes (%)
398	216(54.3%)

Average age of the patients was 54.2 years (range, 27-81years). Dry eye prevalence was more beyond 55 years (77.4 -89.7%) and least in 25-34 years age category with a P value-<0.001 (table-2).

Table-2. Age and dry eye in diabetics

Age (Years)	No. of patients (%)	No. of dry eye
25-34	21	4(19%)
35-44	56	12(21.4%)
45-54	159	71(44.7%)
55-64	133	103(77.4%)
>65	29	26(89.7%)
Total	398(100%)	216(54.3%)

Out of 398 patients, 40.2 %(160) were men and 59.8 %(238) were women. Dry eye was seen in 48.8% (78 of 160) in men while it was 58% (138 of 238) in women with a p value < 0.1 as shown in table-3.

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Table-3. Gender and dry eye in diabetics.

Gender	No of patients (%)	No of dry eyes (%)
Male	160(40.2%)	78(48.8%)
Female	238(59.8%)	138 (58%)

Those with more than 15 years of diabetic status had 80.3% (61 of 76) dry eye prevalence and those with less than 5 year of diabetic status had 42.3%(33 of 78) with p value of <0.001(table-4).

Table-4. Dry eye and duration of diabetes mellitus

Duration of diabetics	No of patients	No of dry eyes (%)
<5years	78	33(42.3%)
5-<15 years	244	122(50%)
>15years	76	61(80.3%)
Total	398	216

Of 398 patients, diabetic retinopathy was seen in 70.4% (280 of 398) and dry eye in 54.3% (216 of 280). Of 216, 38.2% (26 of 68) was the dry eye prevalence in mild non proliferative diabetic retinopathy (NPDR) while, 90.9 % (40 of 44) and 96% (96 of 100) respectively was in severe NPDR and PDR as shown in table-5(p value < 0.001).

Table-5. Dry eye and type of diabetic retinopathy

Type of DR	Mild NPDR	Moderate NPDR	Severe NPDR	PDR
No. of patients (280)	68	68	44	100
No. of dry eye (216)	26	54	40	96
%age of dry eye	38.20%	79.40%	90.90%	96%

Dry eye prevalence was 54.1% (117 of 216) when HbA₁C levels was more than 8.5 as shown in table-6.

Table-6. Dry eye and glycosylated hemoglobin

HbA ₁ C	No. of patients (%)
<6.5	1(0.4%)
6.5-7.5	22(10.1%)
7.5-8.5	76(35.2%)
>8.5	117(54.1%)
Total	216

DISCUSSION: Dry Eye is one of the most common problems ^(8, 9) in present day with several undetermined cases in the population for which, we need to search for an explanation. Dry eye may be a feature of many systemic diseases. One such systemic disease with increasing prevalence in the world is diabetes mellitus.⁽¹⁰⁾ As the dry eye reduces the quality of life so as the diabetes mellitus, it is important to detect and treat both these in time. The mechanism responsible for dry eyes in diabetes mellitus is unclear, but autonomic dysfunction may be responsible. ^(11, 12) Aldose reductase,

the first enzyme of the sorbitol pathway, may however be involved as the oral administration of aldose reductase inhibitors has been shown to improve the tear dynamics significantly through a study.⁽¹³⁾

The dry eye prevalence in type 2 diabetes found in this study was 54.3% with a p value of <0.01. Low values of tear secretion and tear break up time in diabetics than control group was in a study.⁽¹⁴⁾ Similarly, Jin et al showed that patients with type 2 diabetes had tear film dysfunction.⁽¹⁵⁾ Dry eye was found significantly more beyond 55 years (77.4 -89.7%) with a p value-<0.001 and in 58% (138 0of 238) females with p value of <0.1 so as in general population.⁽¹⁶⁾ The association of duration of diabetes and dry eye was highly significant with a p value of <0.001 similar to Klein et al's study.⁽¹⁷⁾ The dry eye prevalence had strong association with severe NPDR and PDR with a p value of <0.001. The glycosylated hemoglobin level above 8.5 had dry eye prevalence of 54.1% similar to a Seifart et al's study.⁽¹⁸⁾

CONCLUSION: The prevalence of dry eye in diabetics was 54.3% which is statistically significant. Dry eye prevalence has significant association with DR and high HbA₁C. Hence, examination for dry eye should be an integral part of the assessment of diabetic eye disease.

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