

A CLINICAL STUDY OF PREVALENCE OF DRY EYES IN DIABETES AND DIABETIC RETINOPATHY

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ABSTRACT

Introduction: Diabetes mellitus is associated with a number of ocular complications which can even lead to blindness. Recently, problems involving the ocular surface, dryness in particular, have been reported in diabetic patients. These patients suffer from a variety of corneal complications, including superficial punctate keratopathy, corneal ulceration, and persistent epithelial defects. In addition, many diabetic patients complain of typical dry eye symptoms, such as burning and/or foreign body sensation, indicating a clear role of tear film abnormalities.

Materials and Methods: A cross sectional study was conducted on 100 diabetic patients who came to the department of Ophthalmology, MGM Hospital, Mumbai. These patients were examined to study the prevalence of dry eyes in patients with diabetes and diabetic retinopathy.

Results: The prevalence of dry eyes in diabetics was 14% with significant association with male gender. The prevalence of Retinopathy among diabetes patients was 18%. Around 55% patients of retinopathy patients suffer from dry eyes, the association was found to be statistically significant.

Conclusion: A significant association was found between retinopathy and dry eyes in present study. Examination for dry eye should be an integral part of the assessment of diabetic eye disease.

KEYWORDS: Diabetes, Diabetic Retinopathy, Dry Eyes, Prevalence

INTRODUCTION

Diabetes mellitus, or simply diabetes, is a group of metabolic diseases in which a person has high blood sugar, either because the pancreas does not produce enough insulin, or because cells do not respond to the insulin that is produced.¹

Globally, as of 2010, an estimated 285 million people had diabetes, with type II making up about 90% of the cases.² India has more diabetics than any other country in the world, according to the International Diabetes Foundation, the disease affects more than 50 million Indians - 7.1% of the nation's adults – and kills about 1 million Indians a year.³

Diabetes mellitus is associated with a number of ocular complications which can lead even to blindness. Diabetic retinopathy, neo vascular glaucoma, cataract, refractory deviations, ptosis, palsy of the oculomotor nerve, and hordeolosis are typical ocular complications in diabetic patients. Recently, problems involving the ocular surface, dryness in particular, have been reported in diabetic patients. These patients suffer from a variety of corneal complications, including superficial punctate keratopathy, corneal ulceration, and persistent epithelial defects. In addition many diabetic patients complain of typical dry eye symptoms, such as burning and/or foreign body sensation, indicating a clear role for tear film abnormalities.⁴

Various earlier studies have reported qualitative and quantitative tear film abnormalities in diabetics, but the precise role of these abnormalities in the pathogenesis of dry eyes is not well defined. More often ocular surface examination is ignored and much importance is given to retinopathy. The present study has been undertaken to evaluate the condition of the ocular surface in diabetic individuals in order to detect possible tear film anomalies and to evaluate the various risk factors responsible for dry eye. Furthermore, an attempt has been made to find any association between diabetic retinopathy and dry eyes.

MATERIALS AND METHODS

A cross-sectional observational clinical study was conducted of 100 diabetic patients who came to the department of Ophthalmology, MGM HOSPITAL, Mumbai. These patients were examined to study the prevalence of dry eyes in patients with diabetes and diabetic retinopathy. This study was conducted over a period of two years between May 2010 to May 2012.

Inclusion Criteria

All patients of either sex, in all age groups (35-75yrs), diagnosed to have diabetes mellitus of any duration were considered.

Exclusion Criteria

- All patients with history of cigarette smoking, contact lens, Lasik surgery, allergies, Sjogren's syndrome, rheumatoid arthritis, Parkinsonism, SLE, Blepharitis, Meibomianitis were excluded.
- Patients on medications such as antihistamines, tricyclic antidepressants, oral contraceptives, and drugs used to treat high blood pressure and diuretics were excluded.
- Patients with vitamin A deficiency and pregnancy were also excluded.

After taking informed consent, detailed history regarding patients name, age, sex, occupation, address, presenting symptoms, duration, progression, and associated conditions was recorded. Detailed history regarding diabetes such as type of diabetes, duration, type of treatment, overall control in the past three months (based on sugar levels, Hb Ac values if available), FBS and PPBS levels were recorded.

This was followed by detailed ocular examination in which following materials were used:

- **Snellen's Chart:** For testing visual acuity
- **Appasamy Slit Lamp:** For detailed anterior segment examination in which condition of lids, meibomian glands, conjunctival surface (dryness, wrinkling and sheen) and corneal surface were noted.
- **Fluorescein Strip:** To measure Tear break up time.
- **Schirmer's Strips:** To perform basal and reflex tearing test.
- **Rose Bengal Stain:** Was used to grade the staining of the cornea and conjunctiva.
- **Schiotz Tonometer:** To measure intraocular pressure.
- **Heine Ophthalmoscope:** For direct ophthalmoscopy.
- **Heine Indirect Ophthalmoscope:** For indirect ophthalmoscopy.

Diabetic retinopathy was further classified as NPDR (non proliferative retinopathy), PDR (proliferative diabetic retinopathy) and Maculopathy. Dry eye was defined as having one or more positive clinical findings (based on slit lamp examination) and one or more positive clinical tests (tear break up time of ≤ 10 seconds, Schirmer's test score ≤ 10 mm, with anaesthesia ≤ 5 mm, Fluorescein score of ≥ 1 , Rose Bengal stain score of ≥ 3.0). Asymptomatic patients with positive signs or positive tests were also considered in the diagnosis.

Dry eye was graded into three types:

- Mild dry eye can be defined in patients who have a Schirmer's test of less than 10 mm in 5 minutes, T BUT less than 10 seconds and less than one quadrant of staining of the cornea.
- Moderate dry eye can be defined in a Schirmer's test of 5 to 10 mm in 5 minutes, T BUT of 5 to 10 seconds with Rose Bengal score of more than 3.
- Severe dry eye can be defined as diffuse punctate or confluent staining (with Fluorescein and Rose Bengal) of the corneal epithelium, often with filaments and diffuse punctae or confluent staining of the conjunctival epithelium. The Schirmer values in these patients are less than 5 mm in 5 minutes and T BUT less than 5 seconds along with Rose Bengal score of 4.

Intraocular pressure [Schiotz method] was recorded as a routine. Detailed fundus examination [under mydriasis] was done under Direct and Indirect ophthalmoscopy and 90 D Slit lamp examinations.

Retinopathy if present was classified as:

- Non Proliferative Diabetic Retinopathy (NPDR)
- Mild NPDR, Moderate NPDR, Severe NPDR Proliferative Diabetic Retinopathy
- Early PDR, High risk PDR
- Maculopathy

Statistical analysis was done using SPSS ver. 17 software and chi-square test was used to compare dry eyes in diabetes and in patients with diabetic retinopathy.

RESULTS

The prevalence of dry eyes in present study was 14% with 10 patients had mild dry eyes, 3 had moderate and 1 had severe dry eyes table 1. Out of 56 males, 10 had mild dry eyes, 2 had moderate and 1 had severe dry eyes. Out of the 44 females only 1 had moderate dry eyes. Present study showed the prevalence of dry eyes to be significantly associated with male gender. No significant association of dry eyes was found with type of diabetes table 3.

The prevalence of Retinopathy among diabetes patients in present study was 18% with 9%, 5% and 3% had mild, moderate and severe NPDR respectively table 4 Around 55% patients of retinopathy had dry eyes, the association was found to be statistically significant table 5.

DISCUSSIONS

In this study, we have made the diagnosis of dry eye based on signs, surface staining with Fluorescein and Rose

Bengal stain, and diagnostic tests which included tear break up time and Schirmer's test (total and basal secretion). In our study we observed that a large number of patients had no symptoms or signs of ocular surface damage yet had abnormal tear break up time or Schirmer values.

In present study, prevalence of dry eyes was found to be 14%. In type I diabetes it was 0% (0/10), and type II it was 15.5% (14/90). In the table given below, prevalence of dry eyes in diabetes reported by various other studies is compared with present study. In a study Inoue et al⁵ found the prevalence of dry eyes in diabetes as 22.8% and in non diabetics as 8.5%. In Beaver Dam Eye Study⁶ prevalence was 19.8% and 13.9% in diabetics and non diabetics. FK Idu and E Oghre⁷ found the prevalence in diabetics as 14.2%. Chen X et al.⁸ found dry eyes in 22% of diabetics while Nepp et al.⁹ found it in 32% of type I diabetics and 38% in type II.

According to the various studies in literature, the prevalence of dry eyes varies from 18.1% to 70%, thereby showing wide disparity. Much of this disparity stems from the fact that there is no standardisation of the types of patients selected for the study, dry eye questionnaires, objective tests and dry eye diagnostic criteria. Moss et al reported a higher incidence of dry eyes in diabetic women (16.7% compared with 11.4% in men).¹⁰

The prevalence of dry eyes was found to be significantly associated with male gender. We might assume that the diabetes-induced KCS may have no sex predilection. But deficient tear secretion from oestrogen deficiency in menopausal women has been hypothesised to explain the increased incidence of dry eyes in females. Also, studies have found that women on hormone replacement therapy may have an increased risk of dry eye.¹¹

In the present study, a significant association was found between retinopathy and dry eyes. Similarly, Nepp and associates were able to correlate severity of retinopathy with the severity of dry eyes.¹² Also, a study by Masoud R Manaviat in 2008 was performed to assess the prevalence of dry eye syndrome and diabetic retinopathy (DR) in type 2 diabetic patients and their contributing factors and concluded that there was a significant association between dry eyes and age, sex, duration and diabetic retinopathy.¹³

Further studies need to be undertaken to establish an etiologic relationship. Therefore, examination for dry eye should be an integral part of the assessment of diabetic eye disease.

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APPENDICES

Table 1: Prevalence of Dry Eyes

Dry Eye Grade	Number of Patient	Percent
No Dry Eyes	86	86.0
Mild Dry Eyes	10	10.0
Moderate Dry Eyes	3	3.0
Severe Dry Eyes	1	1.0
Total	100	100.0

Table 2: Dry Eye Grade Distribution Based on Gender

Gender	Dry Eye Grade				Total	Significance
	No Dry Eyes	Mild Dry Eyes	Moderate Dry Eyes	Severe Dry Eyes		
Male	43	10	2	1	56	χ^2 -10.038, df-3, p -0.018,
Female	43	0	1	0	44	
Total	86	10	3	1	100	

Table 3: Association of Dry Eyes Grade with Type of Diabetes

Type of Diabetes	Dry Eye Grade				Total	Significance
	No Dry Eyes	Mild Dry Eyes	Moderate Dry Eyes	Severe Dry Eyes		
Type 1	10	0	0	0	10	χ^2 -1.089, df-3, p -0.613
Type 2	76	10	3	1	90	
Total	86	10	3	1	100	

Table 4: Prevalence of Retinopathy

Retinopathy	Number of Patient	Percent
No Retinopathy	82	82.0
Mild NPDR	9	9.0
Moderate NPDR	5	5.0
Severe NPDR	3	3.0
PDR	1	1.0
Total	100	100.0

Table 5: Association of Retinopathy with Dry Eyes

Retinopathy	Dry Eyes		Total	Significance
	No Dry Eyes	Dry Eyes		
No	78	4	82	$\chi^2 - 27.42,$ df-1, $p < 0.01$
Yes	8	10	18	
Total	86	14	100	