### **Original Research Article**

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### Prevalence of dry eye syndrome in patients with non-insulin dependent diabetes: in urban South Indian population

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#### ABSTRACT

**Background:** The study was performed to assess the prevalence of dry eye syndrome in patients with non-insulin dependent diabetes in urban south Indian population.

**Methods:** 100 patients with non-insulin dependent diabetes in urban South Indian population were consecutively studied who attended OPD at Ideal Diabetes Care Center. Dry eyes were on the basis of history of ocular discomfort, including soreness, gritty sensation, itchiness, redness, blurred vision that improves with blinking and excessive tearing. The condition was confirmed by ocular surface dye staining pattern with fluorescein, tear film break up time (TBUT) and Schirmer test. All the patients were given artificial tears (carboxy methycellulose sodium eye drops).

**Results:** Of 100 diabetic patients, 60 patients (60.0%) had dry eye syndrome. Dry eye syndrome was more common in older and female patients. A significant association was observed between duration of diabetes and frequency of dry eye syndrome. Of 60 patients with dry eye syndrome 43.0% suffered from gritty sensation, 41.0% had soreness. 26.0% complained from tearing, redness and 11.0% from pain. 60.0% had shimmer test positive. 8.0% had TBUT positive and none of the patients had abnormal corneal sensitivity test positive. Response after using artificial tears was good.

**Conclusions:** Our finding strongly support diabetic patients have an elevated prevalence of dry eye syndrome. In this study the prevalence of dry eye syndrome was 60.0%. So, examination for dry eye should be an integral part of the assessment of dry eye disease. Further results showed management with artificial tears improved dry eye symptoms.

Keywords: Non-insulin dependent diabetes, Dry eye syndrome, Schirmer test, Gritty sensation, Corneal sensitivity

#### **INTRODUCTION**

Diabetes is quickly emerging as one of the biggest health related catastrophes. Diabetes is an epidemic. The World Health Organization (WHO) estimates that there will be 370 million people with diabetes on the planet by 2030.<sup>1</sup>

Diabetes is one of the most common leading cause of blindness in 20-74 years old person. We all know that

high blood glucose levels over the years can lead to nerve damage, heart diseases and damage the retina. But the knowledge and studies on diabetes causes dry eye syndrome is very less.<sup>2</sup> Reduction in quality of life is inevitable when symptoms of dry eye occur. These symptoms range from mild transient irritation to persistent dryness, burning, itchiness, redness, pain, ocular fatigue and visual disturbance. In the United States alone, approximately 7–10 million Americans require artificial tear preparations.<sup>3</sup> Dry eye syndrome has many causes. One of the most common reasons for dryness is aging process.<sup>4</sup> The mechanism responsible for dry eyes is unclear, but autonomic dysfunction may be responsible.<sup>5</sup> 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.<sup>6</sup> 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, the aim of our study was to assess the prevalence of dry eye syndrome in type 2 diabetic patients and explore several potential management strategies for controlling dry eye scenario.

#### **METHODS**

100 Patients with non-insulin dependent diabetes in urban south Indian population were consecutively studied who attended OPD at Ideal Diabetes Care Center. Informed consent was obtained from all subjects. Clinical data of all patients which included sex, age, duration of diabetes, BMI, smoking history were obtained by direct patient interview. This study was done at Ideal Diabetes Care Center, Bangalore and duration of study was from May 2016 to September 2016.

Exclusion criteria included cigarette smoking, contact lens, LASIK surgery, allergies, medications such as antihistamines, tricyclic antidepressants and drugs used to treat high blood pressure and diuretics. Moreover vitamin A deficiency and pregnancy were excluded.

Dry eyes were on the basis of a history of ocular discomfort, including soreness, gritty sensation, itchiness, redness, blurred vision that improves with blinking and excessive tearing. The condition was confirmed by ocular surface dye staining pattern with fluorescein, tear film break up time (TBUT) and Schirmer test, according to American Academy of Ophthalmologist by a specialist. Diagnosis was established by positivity of one or more of the tests (TBUT or Schirmer test). Structures of the eye were assessed with slit lamp biomicroscopy examination. All the patients were given artificial tears (carboxy methycellulose sodium eye drops).

#### Statistical analysis

SPSS version 16 was employed for statistical analysis. Values of less than 0.05 were considered to be statistically significant. Microsoft word and excel have been used to generate graphs and tables. Values of less than 0.05 were considered to be statistically significant.

#### RESULTS

In this study 115 diabetic patients were assessed. 15

patients were excluded from this study because 8 patients had cataract and 1 patient had past history of eye injury and 6 patients had smoking history. 100 diabetic patients were enrolled in this study. Mean age of subjects (26 men, 34 women) was  $53.8\pm10$  years and standard Deviation 13.85 (p<0.05). Of 100 patients, 60 patients (60.0%) had dry eye syndrome, of which 34 (56.9%) were female and 26 (43.1%) were male (Table 1).

Frequency of dry eye in 50-80 years old group was highest (72.2%) and in 20-45 years was lowest (27.8%). Of 60 patients with dry eye syndrome mean duration of diabetes was  $7.2\pm5$  years and Standard Deviation 5.91 (p<0.05) (Table 1).

#### Table 1: Demographic data and clinical characteristics of patients in Mean, SD and percentage.

		Count	Percentage (%)
	Mean	53.8	
Age	Standard deviation	13.85	
	Male	44	44
Sex	Female	56	56
	Yes	0	0
	No	83	83
Smoking history	Occasionally	16	16
	No information	1	1
Duration of diabetes	Mean	7.2	
	Standard deviation	5.91	
Clinical	Sandy and gritty	46	60
characteristics with positive outcome	Redness and itching	60	60
	Pain and burning	16	26



### Figure 1: Clinical features of patients with diabetic dry eye.

The higher the HbA1c values, the higher the rate of dry eye syndrome. A significant association was observed between duration of diabetes and frequency of dry eye syndrome. Of 60 patients with dry eye syndrome 43.0% suffered from gritty sensation, 41% had soreness. 26% complained from tearing and redness and 11.0% from

pain (Figure 1). 60.0% had shimmer test positive. 8.0% had TBUT positive and none of the patients had abnormal corneal sensitivity test positive.

# Table 2: Results of 60 patients comfort response after using artificial tears.

	Count	Percentage (%)
Good	52	86.7
Comfortable	6	10.0
No difference	2	3.3

Response after using artificial tears was good. 50% improvement was seen in patients complains. There was significant decrease in redness, itching, gritty sensitivity, pain and burning. On the average, 87% of the subject was comfortable in using artificial tears. 10% said they are comfortable. 3% of them felt no difference between before giving artificial tears and post artificial tears treatment (Table 2).

# Table 3: Schirmer test response rate after using<br/>artificial tears.

	Count	Percentage (%)
Improved	56	93.3
No difference	4	6.7

# Table 4: TBUT response rate after using artificialtears.

	Count	Percentage (%)
Improved	4	6.7
No change	2	3.3
Constant	54	90.0

There was significant improvement in Schimers test and TUBT after using artificial tears. In terms of Schirmer's test, clinical improvement/response rate is 93%. Only 4% of them felt no difference (Table 3). In terms of TBUT test, 93% of them had either any change or constant. Only 7% of them improved (Table 4).

#### DISCUSSION

Of 100 diabetic patients, 60 patients (60.0%) had dry eye syndrome. Dry eye syndrome was more common in older and female patients. Frequently old dry eye was highest in old group compare to younger age group.

Some studies evaluated dry eye syndrome in diabetic patients. In a cohort study on 3722 subjects were aged 48 to 91 years ( $65\pm10$  years) and 43% male. The overall prevalence of dry eye was 14.4%. Prevalence varied from 8.4% in subjects younger than 60 years to 19.0% in those older than 80 years. Age-adjusted prevalence in men was 11.4% compared with 16.7% in women.<sup>7</sup> In another study a group of 140 patients aged 24–93, suffering from dry eye syndrome were assessed. A larger number of dry eye

syndrome cases were identified in female patients, especially aged over 50 (80% of female and 20% of male).<sup>8</sup>

Seifart et al compared 92 patients with diabetes types I and II and aged from 7 to 69 years with a group of normal healthy controls comparable in number, age and sex. The results show that 52.8% of all diabetic subjects complained of dry eye symptoms, as against 9.3% of the controls. They concluded close monitoring of diabetic patients and good blood sugar regulation is important for the prevention of dry eye syndrome and retinopathy.<sup>9</sup> In Jin study 100 patients with type II diabetes were compared with 80 normal healthy controls. In this study TBUT was significantly lower in type 2 diabetic patients. In Goebels study Schirmer test and tearing reflex was significantly lower in diabetic patients compared with control group.<sup>10</sup>

In other study the tests were carried out on a 100 individuals (50 healthy subjects in control group and 50 subjects suffering from diabetes) age 50–70 years. In that group of diabetic patients (N=50) they found that 37 (74%) of them had lower values of tear secretion. 23 (46%) of them had lower values of TBUT. In the control group (N=50) they found that 28 (56%) had lower values of tear secretion and 17 (34%) of them had lower values of TBUT.<sup>11</sup>

Theories about diabetes mellitus suggest that metabolic, neuropathic, and vascular tissue damage lead to an inflammatory process and functional degeneration of the lacrimal gland and ocular surface.<sup>12</sup> Potential treatments include antioxidants (i.e., nutrition), anti-inflammatory agents (i.e., topical corticosteroids, such as loteprednol, and immunomodulatory agents, such as topical cyclosporine), and anabolic agents that mimic insulin's effects such as autologous serum.<sup>13</sup>

The combination of topical ocular medications and systemic diabetes management is key to achieving successful results. Autologous serum has been shown to significantly improve the ocular surface of patients with diabetes who have corneal epithelial abrasions.<sup>14</sup> In diabetic patients, autologous serum eye drops induced earlier closure of the corneal epithelium after intraoperative abrasions compared with artificial tears (even those containing hyaluronic acid).<sup>15</sup>

Diabetic patients with poor wound healing have been shown to have deficiencies in hyaluronan concentration and collagen density. Although it is unclear how this may or may not apply to artificial tears that contain hyaluronic acid and their effects on the ocular surface, numerous studies illustrate the agent's benefits in systemic diabetes management and wound healing.<sup>16</sup>

Response after using artificial tears was good. 50% improvement was seen in patients complains. There was significant decrease in redness, itching, gritty sensitivity,

pain and burning. On the average, 87% of the subject was comfortable in using artificial tears. 10% said they are comfortable. 3% of them felt no difference between before giving artificial tears and post artificial tears treatment (Table 2).

There was significant improvement in Schimers test and TUBT after using artificial tears. In terms of Schirmer's test, clinical improvement/response rate is 93%. Only 4% of them felt no difference (Table 3). In terms of TBUT test, 93% of them had either any change or constant. Only 7% of them improved (Table 4).

#### CONCLUSION

Our finding strongly support diabetic patients have an elevated prevalence of dry eye syndrome. Out of 100 diabetic patients 60 were dry eye syndrome. In this Study the prevalence of dry eye Syndrome was 60.0%. Diabetes and dry eye appears to have a common association. So examination for dry eye should be an integral part of the assessment of dry eye disease. Hence close monitoring of diabetic patients and good blood sugar regulation is important for the prevention of dry eye syndrome. Further result showed management with artificial tears improved dry eye symptoms. We suggest that patients with diabetes be screened for DES and probably treated long-term for the prevention of ocular surface damage.

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