

## A study of prevalence of dry eye in relation to trachoma

Dipak B. Patel<sup>1\*</sup>, Jyotindra N. Brahmhatta<sup>2</sup>, Hemal V. Jasani<sup>3</sup>, Aditya P. Desai<sup>4</sup>, Parin K. Mehta<sup>5</sup>

<sup>1</sup>Professor, <sup>4,5</sup>Resident Doctor, SBKS Medical Institute & Research Centre, Vadodara, Gujarat, <sup>2</sup>Professor, CU Shah Medical College, Surendranagar, Gujarat, <sup>3</sup>Cataract & Refractive Surgery, Dept. Ophthalmology, Netradeep Eye Hospital, Rajkot, Gujarat

**\*Corresponding Author:**

Email: dr\_deepak1964@yahoo.co.in

### Abstract

**Introduction:** Dry eye disease is a multifactorial disorder of the tear film due to tear deficiency or excessive tear evaporation, which causes damage to the ocular surface leading to tear film instability and is associated with visual disturbances and symptoms of ocular discomfort. The prevalence of dry eye ranging from 5 to 35% Worldwide, while in India it is 29.25% based on OSDI data. Trachoma is the leading cause of infectious blindness worldwide. Destructive nature of trachoma causes dry eye in its chronic course.

**Materials and Methods:** Total 100 patients were included in the cross-sectional study in the duration of one-year duration from February 2010 to February 2011 at Dhiraj General Hospital. They were subjected to slit-lamp biomicroscopy, Schirmer's test I and TBUT. Prevalence of trachoma in diagnosed cases of dry eye was also studied.

**Results:** Prevalence of dry eye during 2010-11 was 17.77%. Amongst them, the prevalence of trachoma was 5%. Mean age of patients was 44.7±14.09 years.

**Discussion:** Dry eye is leading cause of ocular discomfort in OPD patients. Prevalence of dry eye increases with age. There is a definite correlation between dry eye and trachoma. Trachoma is associated with dry, dusty environment, low socio-economical condition, overcrowding and poor hygiene

**Keywords:** Dry eye, Schirmer's test, TBUT, Trachoma

### Introduction

In ophthalmology, intractable burning, discomfort, redness, itching and foreign body sensation are common complaints of patients attending an ophthalmic OPD, but while doing a routine examination, nothing could be found. Dry eye disease is a disorder of the tear film which is either due to tear film deficiency or excessive tear evaporation, which would ultimately cause damage to the ocular surfaces and would cause symptoms leading to ocular discomfort. It is one of the common reasons for patients to visit an ophthalmologist. Worldwide prevalence of dry eye is ranging from 5 to 35%, whereas in India it is 29.25% based on statistics provided by OSDI data.<sup>(1)</sup> Dry eye has a multifactorial etiology. Reported cases have shown that there is a poor correlation between symptoms and signs of dry eye.<sup>(2)</sup> Symptoms of the dry eye have less specificity and also a single objective test for dry eye has a very limited value without the support of symptoms.<sup>(3,4,5)</sup> There are two main components of dry eye, decrease in tear secretion and secondly decrease in tear film stability. Normal tear production test done by Schirmer's test alone cannot rule out a dry eye but we also need to test for the tear film stability by doing Tear film break up time TBUT.<sup>(6,7)</sup> Trachoma is a communicable keratoconjunctivitis caused by the Chlamydia trachomatous, mostly found in the lower socioeconomic group. It primarily affects superficial epithelium characterized by the formation of follicles, papillary hyperplasia, and pannus. Trachoma is a chronic destructive disease of ocular surface pathology which invariably affects the lids, cilia, lacrimal glands,

conjunctiva, and cornea respectively. In its prolonged course it causes damage to the conjunctival epithelium containing Goblet cells, which are important for the production of the tear, causing dry eye. The prevalence of active infection (TF/TI) was 56% (high endemic) in Gujarat, while it was 40.3% (moderate endemic) in M.P.<sup>(8)</sup> In 2003 the WHO estimated that 84 million people were suffering from active trachoma and 7.6 million were severely visually impaired or blind as a result of trachoma.<sup>(9)</sup>

### Aims and Objectives

- To detect patients having Dry eye syndrome and trachoma.
- To establish the relation between trachoma & dry eye.
- To teach the patient for primary and secondary prevention of the trachoma.

### Materials and Methods

We conducted this study in Dhiraj hospital, Pipariya (Vadodara) from February 2010 to February 2011. Detailed clinical history and detailed ophthalmic examination were conducted and Schirmer 1 and 2, TBUT was done in every patient. We have taken approval of an ethical committee of our institute before conducting the study.

### Inclusion Criteria:

- Patients aged between 15 to 65 years were taken.
- Patients who complained of itching, redness, discomfort (foreign body sensation), burning, watering and photophobia were taken.

- All diagnosed cases of trachoma.
- Patients who had either abnormally low Schirmer's test I (without anesthesia) or low TBUT or both which were <10mm/5minutes with opened eyes and <10 seconds respectively.

#### Exclusion Criteria:

- Patients aged <15 years & >65 years.
- Pregnant and nursing mother.
- Patients who had corneal surface irregularity disorders like degeneration, dystrophy, tumors, active ulcer, burns, active infections of cornea, conjunctival disorders like pterygium, tumors, degenerations, lid disorders like active growth, tumors, congenital anomalies.
- Patients who had a major systemic illness like hematological, cardiovascular, gastrointestinal, renal, urogenital, central nervous system disorders.

For the purpose of the study, mainly two groups of patients were selected, those having a dry eye with signs & those in whom there were no signs of dry eye on SLE (slit lamp examination). In all the patients of dry eye, Schirmer's test & TBUT (an average of four) were taken.

Detailed clinical history according to proforma along with thorough ophthalmic examination taken during OPD visit. Patients were subjected to different special methods of investigation like Schirmer's test-I with commercially available Tear strips and TBUT with Fluorescein's strip. They were also subjected to slit lamp examination to detect any abnormal signs of dry eye and trachoma.

#### Results

All patients who visited our outdoor department with various symptoms of dry eye were found to be later diagnosed to have abnormal tests for dry eye and trachoma while conducting this study.

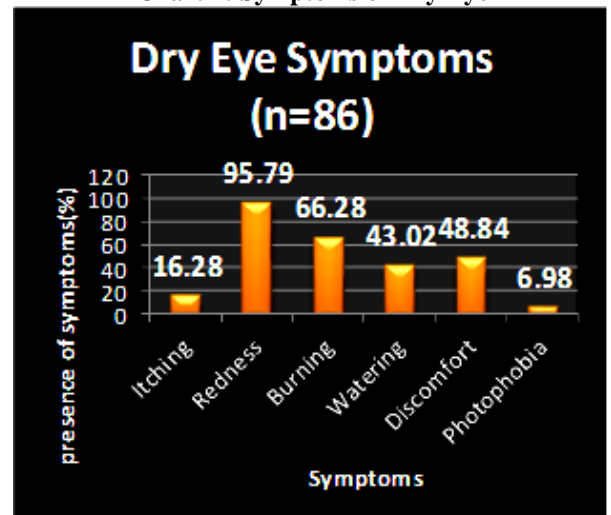
Total 200 eyes of 100 patients were included in the study of one-year duration. They were divided into 2 groups on the basis of presence or absence of dry eye signs on the slit-lamp biomicroscopy. Group I includes 86 patients having signs of the dry eye while group II includes 14 patients having no signs of dry eye but positive for dry eye tests.

Mean age of patients were  $44.7 \pm 14.09$  years. The total number of patients examined were 100 (between 15 to 65 years), younger patients <15 years old were not taken for the study because at their initial trial cooperation for Schirmer's test & TBUT was inadequate. A total number of male patients were highest in 56-60 and 60-65 years age group. It suggests that there may be senile changes in conjunctiva and cornea and longer exposure time to environmental factors are responsible for dry eye in older age group. More female patients were found in 46-50 years age group which may be due to the effect of hormonal changes in the menopausal period.

In Group I male patients were 62 (72.09%), while female patients were 24 (27.91%). In Group II male patients were 8 (57.14%), while female patients were 6 (42.86%). So total 70 male patients and 30 female patients were included in this study.

Our study indicates that burning (59%) & redness (58%) were most common symptoms of patients having dry eye. Other symptoms also includes ocular discomfort (foreign body sensation) (44%), watering (37%), itching (22%) & photophobia (6%). Total 22 patients had complained of itching, 14 out of them had signs of dry eye while in 8 it was absent. Total 58 patients had complained of redness, out of them 54 had signs of the dry eye while 4 were free from signs. Total 59 patients had burning sensation in which 57 had positive slit-lamp finding while 2 were normal on examination. Out of the 44 patients having discomfort in the eye, 42 were abnormal, while 2 were normal on slit-lamp examination. 37 patients having a complaint of watering, all were positive for abnormal slit-lamp finding. Only 6 patients had photophobia.

Chart 1: Symptoms of Dry Eye



In relation to dry eye, out of 77 patients of Gujarat, 3 (3.89%) had trachoma; while out of 23 patients of M.P., 2 (8.69%) had trachoma. So the prevalence of trachoma in Gujarat (Baroda district) was 3.89%; while in M.P. it was 8.69%, which is quite high due to environmental, low socio-economical and overcrowding (poverty with poor hygiene) factors.

Out of 100 patients of dry eye 47 (47%) were outdoor workers (farmers, labourers, carpenters, drivers, welding workers, bakery workers & construction workers); while 15 (15%) were indoor workers (goldsmiths, teachers, computer workers, shopkeepers), housewives (27%) & students (4%) by occupation. The rest 7% were retired out of which some had previous exposure to outdoor or indoor working experience. So, they were also a candidate for dry eye in their retired life.

Out of 100 patients of dry eye, 10 (10%) patients had a history of smoking; while 8 (8%) patients taking tobacco by mouth (chewing). Out of these, 2 (2%) patients had both of these addictions. Outdoor workers were more commonly associated with addictions; who had more chances of dry eye as they had superadded environmental factors.

In this study, we find that smoking was more commonly associated with the dry eye than tobacco chewing. Local heat and carbon particles in the smoke might change the ocular surface stability like the hot environment and air polluted environment respectively.

**Table 2: Signs of Dry Eye**

Signs	No. of patients
Normal	14
Follicles (<5mm)	39
Concretions	33
Papillary enlargement	26
Blepharitis	9
Follicles (>5mm) (trachoma)	5
Meibominitis	5

In dry eye syndrome, 14 patients having normal slit- lamp examination; while in rest 86 patients the most common sign was follicles (<5mm) (45.35%); other signs includes papillary enlargement, concretions, blepharitis, meibomitis and follicles (>5mm). Blepharitis & meibomitis were the risk factors for dry eye.

Out of 86 patients with signs on SLE, 74 (86.04%) had abnormal (low) TBUT and 12(13.95%) had normal TBUT. Out of 14 patients with normal SLE, 6 (42.85%) had normal TBUT and 8 (57.15%) had low TBUT.

A stable tear film is essential for the health of the corneal epithelium. A quickly breaking tear film or biochemically defective tear film can cause significant discomfort to the patient & may even compromise the corneal transparency. It is, therefore correct to evaluate the TBUT of the patient in this series in relation to the signs of the dry eye.

**Table 3: Signs of Dry Eye and Schirmer's test**

Schirmer's test	Signs present	Signs absent	Total
Normal	7	3	10
Abnormal	79	11	90
Total	86	14	100

Out of 86 patients having signs of dry eye, 79 (91.86%) patients had abnormally low Schirmer's test; 7 (8.14%) patients had normal Schirmer's test in spite of signs of dry eye. Out of 14 patients, 11 (78.57%) patients had abnormally low Schirmer's test with no signs of dry eye; while 3 (21.43%) patients had normal Schirmer's test with the absence of dry eye signs.

On conducting age wise reading of the TBUT, it is seen that mean TBUT was high in the younger age group 15-20 years, while with increasing age mean TBUT decreases gradually, in 60-65 years age group. Thus as the age advances, TBUT doesn't keep pace and goes on decreasing more or less consistently with increasing age.

## Discussion

The present hospital based cross-sectional study, "The prevalence of dry eye in relation to trachoma" was conducted in a tertiary care center in Western India (Gujarat) from February 2010 to February 2011. 200 eyes of 100 patients were selected on the basis of Schirmer's test and TBUT as dry eye cases for this study.

Detailed clinical history according to proforma along with thorough ophthalmic examination taken during OPD visit. Patients were subjected to different special methods of investigation like Schirmer's test-I with commercially available Tear strips and TBUT with Fluorescein's strip. They were also subjected to slit lamp examination to detect any abnormal signs of dry eye and trachoma.

All patients belong to age group 15 to 65 years. Total male patients were 70 and total female patients were 30. Mean age of patients was 44.7±14.09 years. Total patients were highest in an older age group in male and in the menopausal period in the female.

They were divided into 2 groups on the basis of signs present or absent on the slit- lamp bio-microscopy.

Group I includes 86 patients having signs of the dry eye while group II includes 14 patients having no signs of dry eye but positive for dry eye tests. In group I out of 86 patients, 62 (72.09%) were males and 24 (27.91%) were females. In group II out of 14 patients, 8 (57.40%) were males and 6 (42.86%) were females. Dry eye disease is a disorder of the tear film due to tear deficiency or excessive tear evaporation, which causes damage to the ocular surface and is associated with symptoms of ocular discomfort.

To form a stable tear film sufficient aqueous and mucous production, normal lid function to spread tear film and lid – corneal surface congruity is essential.

Gross irregularities give rise to localized areas of poor mucous surfacing and thin tear film which breaks up, ultimately to cause desiccation.

A population-based prevalence survey (the SEE project) included 2520 residents of Salisbury, middle-aged 65 years and older in September of 1993. In this population, 14.6% had one or more reports of symptoms often or all time, 2.2% had symptoms and a low Schirmer's test-I result ( $\leq 5$  mm) of strip wetting and 2% were symptomatic. Furthermore, 3.5% had a symptom and a low Schirmer's test-I.<sup>(10,11)</sup> In our study, 93% patients of the dry eye had complaints of burning

and redness. Discomfort was present in 95% patients of dry eye and 5% patients had meibomitis.

In the BDES cohort of 3722 patients aged from 48 to 91 years, a prevalence of dry eye by self-reported history at the 5-year follow-up visit was found to be 14.4%.<sup>(12)</sup> In our study, the prevalence of dry eye in the 2010-11 year was 17.77% among ophthalmology OPD patients. In which the age distribution was 15 to 65 years.

The Melbourne Visual Impairment Project (MVIP) of age-related eye disease in people 40 years and older had a total of 926 patients participating. Dry eye was diagnosed in 10.8% by rose bengal staining, 16.3% by Schirmer's test-I, 8.6% by tear break-up time, 1.5% by Fluorescein staining, 7.4% with two or more signs of the condition and 5.5% with any severe symptom.<sup>(13)</sup> In our study 79% patients had <10 mm Schirmer's test- I score, while the low score (<10 seconds) of TBUT was present in 74% patients.

According to several studies related to dry eye, the prevalence of dry eye is more in females than in males. But according to our study, it was more for males (70%) than females (30%).

The prevalence of active trachoma among children aged <10 years has been estimated by WHO at 2.02%. The prevalence of active infection (TF/TI) was 56% (high endemic) in Gujarat, while it was 40.3% (moderate endemic) in M.P.<sup>(14)</sup>

According to our study, the prevalence of trachoma in Gujarat (Vadodara district) was 3.89%; while in M.P. it was 8.69% which was quite high due to factors like some environmental, low socio-economical and overcrowding (poverty with poor hygiene). In our study 5% patients of the dry eye had trachoma. In trachoma patients, 3 had concretions and 2 had pannus formation on the upper corneal zone. They also had signs of trichiasis. Conjunctival scarring was also present in these cases.

## Conclusion

Schirmer's test alone has no significance as far as diagnosis of dry eye is concerned. Schirmer's test and TBUT both together add on the diagnosis of dry eye syndrome.

TBUT reading was found to be decreased with the advancing age while Schirmer's test readings were not found to decrease with the advancing age.

In Trachoma patients all had very low tear film break-up time and Schirmer's test reading.

Smoking was an associated risk factor for dry eye. Addiction increases the risk of dry eye syndrome by disturbing tear film.

Occupation was an important factor contributing to dry eye. As outdoor workers had exposure to hot, dry environment and had more exposure to ultraviolet rays in sunlight. Computer workers prone to develop dry eye as during working time blinking rate decreases.

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