

## ORIGINAL ARTICLE

# EVALUATION OF VARIOUS RISK FACTORS OF DRY EYE

Renu Magdum<sup>1</sup>, Atreyee K Pradhan<sup>2</sup>, Dhavat P Sukharamwala<sup>2</sup>, Khevna Patel<sup>2</sup>

**Authors' Affiliation:** <sup>1</sup>Professor; <sup>2</sup>Resident, Ophthalmology, Dr. D.Y. Patil Medical College & Hospital, Pune

**Correspondence:** Dr. Dhavat P Sukharamwala, Email: dhavat7@yahoo.com

## ABSTRACT

**Purpose:** This study was conducted to evaluate the various risk factors of dry eye in a hospital based population.

**Materials and methods:** 250 consecutive patients of above 10 years age attending outpatient department of a tertiary care hospital were screened. Objectives test for dry eye were done such as Schirmer's test, tear film break up time was done to diagnose dry eye. The role of age, sex, systemic diseases, systemic medication, and smoking were assessed.

**Results:** Out of 250 patients 147 (58.80%) of cases showed signs and symptoms of dry eye. Majority of cases were in age group of 40 to 49 61(24.40%). There was not much difference according to sex.53 (21.20%) of cases had dryness, 39 (15.60%) had foreign body sensation and 31 (12.40%) had grittiness.59 (23.60%) cases were smokers. Among systemic diseases such as hypertension, diabetes mellitus, ischemic heart diseases and depression, only depression was statistically significant ( $p<0.005$ ). Use of systemic drugs such as antihistamines, antidepressant and antihypertensive were statistically significant ( $p<0.005$ ) and associated with risk of dry eye.

**Conclusion:** Our study indicates that dry eye is one of the commonest conditions seen in outdoor patients today, due to increased computer and air condition use. Though it seems trivial, it can cause distressing symptoms which affect day to day life. Preservative free artificial tear drops are also beneficial and non toxic even in long term use. Schirmer's test, though easy and cheap is known to over diagnose the condition. Hence we need better tests to diagnose tear film deficiency.

**Keywords:** Dry eye, Schirmer's test, tear film break up time

## INTRODUCTION

Dry eye is a condition caused by the reduction in quality or quantity of tears. The National Eye Institute/Industry Workshop on Clinical Trials in Dry Eyes<sup>1</sup> defined dry eye as "a disorder of the tear film due to tear deficiency or excessive tear evaporation, which causes damage to the inter-palpebral ocular surface and is associated with symptoms of ocular discomfort". The tear film and ocular surface form a complex and stable system that can lose its equilibrium through numerous disturbing factors. Reduction in quality of life is inevitable when symptoms of dry eye occur. Various risk factors for dry eye alluded to in literature include air pollution, cigarette smoking, low humidity, high temperature, sunlight exposure and drugs. Aim of our study is to estimate the prevalence of dry eye in population based study and to explore its relationship with various risk factors.

## MATERIAL AND METHODS

Total 250 consecutive patients of above 10 years age attending outpatient department of a tertiary care hospital were included in the study. Patients with history of lagophthalmos, proptosis, lid deformities or diseases, facial paralysis and lacrimal gland diseases were excluded. Informed consent and permission of IEC was

taken for the study. Detailed history of patient was recorded including details of sex, age, nature of work. Any complaints like grittiness, foreign body sensation, dryness which indicate dry eye were asked and documented. History of smoking or other addictions, systemic diseases such as hypertension, diabetes mellitus, depression and systemic medication such as anti hypertensive, hypoglycaemic, antidepressants, antihistamine and oral contraceptive pills were documented and analysed. Visual acuity in both eyes was checked by Snellen's visual chart. Detailed slit lamp examination was done to exclude any lid conditions such as meibomitis, meibomian gland openings, mucin strands or debris, any eye lid deformities and lagophthalmos which may disturb the normal tear film. Presence of watering or frothy discharge was examined. Applanation tonometry (mm of Hg): was carried out using Goldmann's applanation tonometer. Objectives test for dry eye were done such as Schirmer's test, tear film break up time was done using various strips impregnated with specific dyes. In our study we used Schirmer test I to evaluate tear secretion. The test was performed by using a Schirmer strip (no.41 Whatman Filter paper, 5mm wide & 35 mm long). The strip first folded around 5 mm from the 5 mm marking and was placed in the lateral one third of the lower lid. The

patient was asked to refrain from talking or chewing gum during the procedure and not to close the eyes.

After 5 minutes both the strips were removed from the fornices and wetting of the filter paper strip was noted. We have taken less than 10 mm of wetting as our cut off point to diagnose dry eye.

Tear film stability was measured by tear film break up time. We used fluorescein-impregnated strip wet with lubricating eye drop (preservative free) to stain the tear film. The strip was placed in lower fornix at lateral one third and after 2 minutes strips were removed. Under slit lamp examination, the time between the last blink and the appearance of the first break (randomly distributed dry spot or hole) in the pre-corneal fluorescent tear film was measured. For time measurement in our study we used stopwatch to calculate accurately. Appearance of dry spots before 10 seconds was considered as dry eye.

**RESULTS**

Out of 250 patients 147 (58.80%) of cases showed signs and symptoms of dry as diagnosed by Schirmer’s test and TBUT and 103 (41.20%) cases had normal eye.

**Table 1: Association between age and outcome in study group**

Age (Yrs)	Dry eye		Total
	Yes	No	
15 – 19	0	15 (6)	15 (6)
20 – 29	11 (4.40)	24 (9.60)	35 (14)
30 – 39	28 (11.20)	28 (11.20)	56 (22.40)
40 – 49	36 (14.40)	25 (10)	61 (24.40)
50 – 59	49 (19.60)	10 (4)	59 (23.60)
60 – 69	23 (9.20)	1 (0.4)	24 (9.60)
Total	147 (58.80)	103 (41.20)	250 (100)

Chi-square = 61.93, P<0.0001

**Table 2: Association between Sex and outcome in study group**

Sex	Dry eye		Total
	Yes	No	
Male	72 (28.80)	55 (22)	127 (50.80)
Female	75 (30)	48 (19.20)	123 (49.20)
Total	147 (58.80)	103 (41.20)	250 (100)

Chi-square = 0.47, P>0.05

Majority number of cases were in age group of 40 to 49 followed by 50 to 59 and 30 to 39 i.e. 61(24.40%), 59(23.60%) and 56(22.40%) respectively. There was not much difference according to sex. Majority of cases i.e. 79 (31.60%) were labours, followed by 59 (23.60%) were office workers, 47 (18.80%) were farmers. 36 (14.40%) cases were students. 29 (11.60%) of cases were housewife. 53 (21.20%) of cases had dryness, followed by 39 (15.60%) with foreign body sensation and 31 (12.40%) cases had gritiness. 59 (23.60%) of cases were smoking currently, followed by 47 (18.80%) of cases

had smoking habits in past and 144 (57.60%) cases were non smokers. Among systemic diseases such as hypertension, diabetes mellitus, ischemic heart diseases and depression, only depression was statistically significant (p<0.005). Rest of systemic diseases did not show statistical significant findings. (p>0.05)

**Table 3: Association between systemic diseases and outcome in study group**

Systemic diseases	Dry eye		Chi square	P Value
	Yes (n=147)	No (n=103)		
DM	20 (13.6)	10 (9.7)	0.87	>0.05
HTN	28 (19.0)	11 (10.7)	3.22	>0.05
Depression	11 (7.5)	0 (0.0)	8.06	<0.005
IHD	2 (1.4)	0 (0.0)	1.41	>0.05

Figure in parenthesis indicate percentage

**Table 4: Association systemic medication and dry eye in study group**

Systemic medication	Dry eye		Chi square	P Value
	Yes (n=147)	No (n=103)		
Anti depressant	11 (7.5)	0 (0.0)	8.06	<0.005
Anti histaminic	18 (12.2)	0 (0.0)	13.59	<0.0001
Anti hypertensive	28 (19.0)	10 (9.7)	4.1	<0.05
Hypoglycemic	20 (13.6)	10 (9.7)	0.87	>0.05
OCP	21 (14.3)	13 (12.6)	0.14	>0.05

Figure in parenthesis indicate percentage

Majority of cases were on antihypertensives 38 (15.20%) followed by hypoglycemics 30 (12%). 34 cases were on Oral Contraceptive Pills, remaining 29 cases were on anti depressants and anti histamines.

**Table 5: Association between smoking and dry eye in study group**

Smoking habits	Dry eye		Total
	Yes	No	
Current	37	22	59
Past	35	12	47
No	75	69	144
Total	147	103	250

Chi-square = 7.82, P<0.05

**Table 6: Occupation wise distribution of cases in study group**

Occupation	Cases (%)
Office worker	59 (23.60)
Housewife	29 (11.60)
Farmer	47 (18.80)
Labour	79 (31.60)
Student	36 (14.40)
Total	250 (100)

**DISCUSSION**

In our study total 58.80% patients had dry eye. So prevalence of dry eye in our study is quite on higher side. According to previous study the prevalence of dry

eyes varies from 10.8% to 57.1%,<sup>4</sup> thereby showing wide disparity.<sup>5</sup> The high prevalence rate of our study may have many aspects. Although the Schirmer test was the only single test to be associated with frequent dry-eye symptoms in this population, we do not suggest that it could be used as the best screening tool for dry eye. Its sensitivity and specificity in detecting symptomatic subjects were low. One of the major reasons for the low sensitivity and specificity is the heterogeneity of dry-eye syndrome. A low Schirmer result of  $\leq 5$  mm is associated in this population with frequent dry-eye symptoms<sup>6</sup>. Schirmer test yielded the highest number of false positives in one study of McCarty et al. However, the high false-positive rate reduces the usefulness of this test in identifying asymptomatic subjects<sup>7</sup>.

Maximum numbers of dry eye cases were in age group of 30 to 59 years. Sex wise distribution of dry eye did not show much variation among males and females. . Majority of labourer's were suffered from dry eye followed by office workers. Farmers and students also had symptoms of dry eye 59(23.60%) currently smokers and 47(18.80%) with past history of smoking were suffering from dry eye. 144 cases who were non smokers had dry eye. (Table no 5)

Hypertension, diabetes and depression were the systemic diseases observed in patients with dry eye. But majority of patients were without any systemic disease. Patients who were on OCP, antihypertensives, hypoglycemics and antihistaminics had dry eye. (Table no 3 & 4). Dryness of eyes, foreign body sensations and grittiness were the symptoms among cases in study group. Among 147 patients with dry eye 19.60% were between 50-59 years of age and 14.40 % were in between 40-49 years of age. Sex was not associated with dryness, foreign body sensation of grittiness symptoms in study group. Similar finding was observed in a study who estimated the 5-year incidence of dry eye and to examine its association with risk factors<sup>5</sup>. Smoking was also significantly associated with dry eye (Table no 5) Similar finding was observed in a study where risk factors for the prevalence of dry eye in population based cohort.<sup>8</sup>

## CONCLUSION

Our study seems to indicate that dry eye is one of the commonest condition seen in outdoor patients today, due to increased computer and air condition use. Though it seems trivial, it can cause distressing symptoms which affect day to day life of the person. Even simple advice to a computer user to increase blink rate can go a long way in decreasing symptoms. Preservative free artificial tear drops are also beneficial and non toxic even in long term use.

Schirmer's test, though easy and cheap is known to overdiagnose the condition. Hence we need better tests to diagnose tear film deficiency.

## REFERENCES

1. Lemp MA. Report of the National Eye Institute/Industry Workshop on clinical trials in dry eyes. *CLAO J* 1995;21:221-32.
2. A J Lee, J Lee1, S-M Saw, G Gazzard, D Koh, D Widjaja, D T H Tan, Prevalence and risk factors associated with dry eye symptoms: a population based study in Indonesia *Br J Ophthalmol* 2002;86:1347-1351 doi:10.1136/bjo.86.12.1347
3. Scot E. Moss, MA; Ronald Klein, MD, MPH; Barbara E. K. Klein, MD, MPH Incidence of Dry Eye in an Older Population *Arch Ophthalmol.* 2004;122:369-373.
4. Hikichi T, Yoshida A, Fukui Y, Hamano T, Ri M, Araki K, et al . Prevalence of dry eye in Japanese eye centers. *Graefes Arch Clin Exp Ophthalmol* 1995;233:555-8.
5. Moss SE, Klein R, Klein BE. Prevalence and risk factors of dry eye syndrome. *Arch Ophthalmol* 2000;118:1264-8.
6. Pflugfelder SC, Tseng SC, Sanabria O, et al. Evaluation of subjective assessments and objective diagnostic tests for diagnosing tear-film disorders known to cause ocular irritation. *Cornea.* 1998;17:38-56.
7. McCarty CA, Bansal AK, Livingston PM, Stanislavsky YL, Taylor HR. The epidemiology of dry eye in Melbourne, Australia. *Ophthalmology.* 1998;105:1114-1119.
8. Lee AJ, Lee J, Saw SM, et al. Prevalence and risk factors associated with dry eye symptoms: a population based study in Indonesia. *Br J Ophthalmol.* 2002;86:1347-1351.