



ORIGINAL RESEARCH PAPER

Ophthalmology

PREVALENCE AND RISK FACTORS OF DRY EYE AMONG PATIENTS OF A TERTIARY CARE CENTRE IN EASTERN INDIA

KEY WORDS: Dry eye, McMonnies questionnaire, Schirmer's test, Tear film break-up time.

Dr. Nilesh Mohan	MD (AIIMS), DNB, ICO (Basic Ophtha) Additional Professor, RIO, IGIMS, Sheikhpura, Patna
Dr. Vandana Parasar	MS Senior Resident, RIO, IGIMS, Sheikhpura, Patna
Dr. Ankita Singh	MS Senior Resident, RIO, IGIMS, Sheikhpura, Patna
Dr. Rakhi Kusumesh*	MS Additional Professor, RIO, IGIMS, Sheikhpura, Patna. *Corresponding Author

ABSTRACT

AIM: To determine the prevalence and risk factors of dry eye among patients of a tertiary care centre in eastern India. Symptoms of dry eye are encountered as one of the most frequent complains among the patients attending the outpatient department in ophthalmology commonly presenting as ocular discomfort, burning sensation and foreign body sensation. Prevalence of this entity is still not known in our study population due to lack of specificity of symptoms and diagnostic criteria. **MATERIALS AND METHODS:** A prospective, observational, cross-sectional study was conducted among patients attending ophthalmology OPD in a tertiary care teaching hospital of Bihar. 4116 (16.64%) patients with dry eye symptoms were examined after taking informed consent. **RESULTS:** 1620 (6.55%) patients were found to have dry eye based on McMonnies questionnaire, Schirmer's test and tear film breakup time. There were 1180 female and 440 male with dry eye. Male to female ratio was 2.7:1. Non-tribals were affected more commonly than tribals. Students, outdoor workers and office worker with professional constituted over fifty percent of dry eye cases. **CONCLUSION:** Prevalence of dry eye was more in females and elderly as compared to male and younger population respectively. Burning sensation and ocular discomfort was the most common presenting complains.

INTRODUCTION:

Burning sensation and ocular irritation is the common presenting complains in patient attending ophthalmology OPD during summer. The condition is diagnosed as dry eye, a disorder of tear films. Keratoconjunctivitis sicca (KCS) is a multifactorial disease caused by decreased tear production or excessive tear evaporation, leading to the symptoms of dry eyes¹.

Normal tear film consists of three layers: superficial lipid layer produced by the meibomian glands, middle aqueous layer produced by the lacrimal gland and accessory lacrimal glands of Wolfring and Krause and innermost mucin layer produced by the goblet cells. Each layer has their own specific functions. Lipid layer prevents evaporation of tear films, middle layer constitutes 90% of ear film and inner layer lowers the surface tension and renders the corneal surface wet².

There are two main categories of dry eye conditions. *Aqueous tear-deficient dry eye (ATDDE)*, caused by deficiency of lacrimal gland in producing tears e.g. Sjogren's syndrome (SS) *Evaporative dry eye (EDE)* caused by excessive evaporation of tears e.g. dry eye due to meibomian gland dysfunction, ocular surface disorders, low blink rate, computer vision syndrome etc. In diabetes mellitus, lacrimal gland dysfunction, decreased corneal sensitivity and loss of goblet cells leads to dry eye syndrome. Various drugs and disease conditions also can lead to dry eyes like symptoms³.

Early diagnosis is the key in preventing patients from vision-threatening complications of dry eye disease. Symptom assessment with screening and diagnostic tests are used to establish the diagnosis of dry eye. McMonnies questionnaire is a well-balanced and focused screening test for dry eye⁴. It is a subjective test with sensitivity of 87-98% and specificity 87-97%⁴. This questionnaire consists of 12 questions related to the risk factors for DED. These include demographic information, dry eye symptoms, previous and current dry eye treatments, secondary symptoms (associated with environmental stimuli), systemic conditions (Sjogren

syndrome, arthritis, thyroid disease), and dryness of the mucous membranes (chest, throat, mouth or vagina)⁵. Due to subjective nature of self-reported symptoms, test is reliable and repeatable than objective clinical tests in detecting dry eye. A study done by Nichols KK showed that objective test such as Schirmer's test adds to the final diagnosis of dry eye disease⁶. Tear film breakup time (TBUT) is a clinical test used to assess evaporative dry eye disease. To measure TBUT, tear film is stained with sodium fluorescein 1% and patient is asked not to blink while the tear film is observed under a broad beam of cobalt blue illumination in slit lamp. Time is noted for the first appearance of a "dark" dry spot which is recorded as the TBUT⁷. Thus, this study used McMonnies questionnaire for screening and Schirmer's test and TBUT for diagnosis of dry eye disease to evaluate the proportion of dry eye cases among medical students of a tertiary Care hospital⁵.

AIM: To determine the prevalence and risk factors of dry eye among patients of a tertiary care centre in eastern India.

MATERIALS AND METHODS : This was a cross-sectional study conducted in the Regional Institute of Ophthalmology, Indira Gandhi Institute of Medical Sciences, Sheikhpura, Patna between August 2018 to September 2019 after taking approval of the competent authority. Study was done in accordance with the principles expressed in the Declaration of Helsinki. 4116 patients attending the eye OPD and provisionally diagnosed with dry eye disease were selected for the study meeting the inclusion criteria. Informed consent form written in English and vernacular languages were obtained from each participant. Collection and analysis of the data were anonymous; In addition, the clinical tests did not cause any physical harm to patients. We believed nothing was against health, safety and privacy of patients in this study. *Inclusion criteria:* Patients attending ophthalmology OPD with age at presentation above 18 years with presenting complain consistent with dry eyes⁸ (ocular discomfort, burning sensation, redness, itching, dryness etc) were included in this study.

Exclusion criteria: Patients taking any ocular or systemic

medications, or had undergone intra or extra ocular surgery or with an active ocular infection in the previous 6 months were excluded from the study also patient not giving consent or had not agreement with the study were excluded. *Procedures for assessing the dry eye*-Subjects were asked to fill McMonnies questionnaire which had 14 questions that focused on the clinical risk factors for dry eye. These were related to age, gender, dry eye symptoms (foreign body sensation, burning, itching etc) feeling of dryness and tiredness, previous treatment for dry eye, secondary symptoms (associated with environmental stimuli), systemic diseases, dryness of mucous membranes, and systemic medications¹⁰. *Scoring of the dry eye*-The scores ranged from 0 to 45. Individuals having McMonnies score greater than 14.5 were evaluated for Dry Eye diagnosis¹¹. *Schirmer's test -A* sterilized Schirmer's strip (5 X 35 mm Whatman filter paper no. 41) was placed over the junction of medial two- third and lateral one-third of lower lid after instilling a drop of (0.5%) Proparacaine. The test was considered positive when the level of strip wetting (in millimeters) after five minutes was less than ten millimeters. Positive Schirmer's test represents *aqueous tear deficiency*¹⁰. *Procedure of tear film break-up time*-A sterilized 2% fluorescein strip was moistened with lubricating eye drop and placed in the lateral one-third of lower lid in a non-anaesthetised eye and patient was asked to blink only once or twice to avoid pooling of fluorescein, following which the strip was removed. Tear film was observed on Cobalt blue light of the slit lamp and time was noted. Time lapse between the last blink and the appearance of the first randomly distributed dark discontinuity in the fluorescein-stained tear film is the tear break up time. Values of less than 10 seconds were considered abnormal¹⁰.

Diagnosis of dry eye- It was done with positive Schirmer's test (wetting <10 mm) and TBUT of <10 s along with McMonnies score more than 14.5¹¹. The results of tear function tests were further subjected to scoring system (Khurana (1993) scoring system to assess the severity of dry eye¹². According to their scores, the patients were graded to be having

- 1.No dry eye (0-1)
2. Dry eye suspect (2)
- 3.Mild dry eye (3-8)
4. Moderate dry eye (9-13)
5. Severe dry eye (14-18)

Data were noted on a standardized pro forma.

RESULTS :

During the study period total 24732 patients attended the ophthalmology OPD, of which 4116 (16.64%) patients were suspected cases of dry eyes. These cases were further examined with McMonnies Questionnaire , Schirmer's test and Tear film breakup time (TBUT) to confirm the diagnosis and classify the disease in mild, moderate and severe dry eyes cases. 1620(6.55%) subjects had McMonnies score above 14.5 and confirmed to have dry eyes¹¹. Thus the incidence of dry eyes in the study population was 6.55%. These were further evaluated by Schirmer test and TBUT and classified in mild, moderate and severe cases. 1180 (72.83%) were female and 440(27.1%) were male [Table 1]. Female to male ratio was 2.7:1 Dry eye was more common among urban population and in hypermetropes. Also the incidence was lesser in tribal population. Patients were distributed from 18 to 73 years with majority above 42 years. Mean age of the study population was 49.1 years. Figure 1 represents age distribution of the patients with dry eyes. In all the three groups, dry eye was more common in female than male. In male most common age group affected was 18-40 years while female above 61 years were affected most commonly. Farmers, labourers and outdoor workers were the two occupation groups affected more commonly (Figure 2). Table 2 represents the common symptoms reported by the patients. Most common symptom reported was burning sensation, ocular discomfort and foreign body sensation. In this study,

moderate grade of dry eyes was seen in about 61.37% of cases, while mild and severe grade of dry eyes were seen in 32.60 and 8.38 % of cases respectively.

Table 1

Population Characteristics of Dry eye cases (n=405)	
1. Male : Female =	110 : 295
2. Rural : Urban =	191 : 214
3. Tribal : Non tribal =	127:278
4. Refractive status	
Hypermetropes =	210
Myopes =	126
Emmetropes =	69

Table 2

Common symptoms reported by patients with dry eye	
Burning sensation	
Ocular discomfort	
Foreign body sensation	
Watering	
Dryness	
Grittiness	
Itching	
Scratchiness	
Redness	
Ocular pain	
Photophobia	

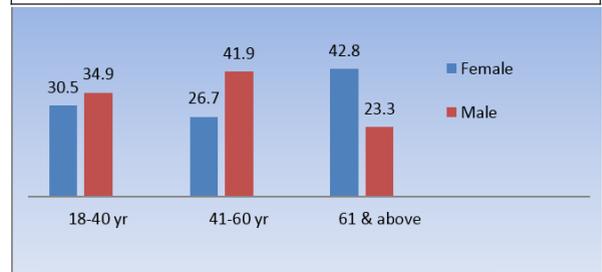


Figure 1 : Age distribution of patients with dry eyes (%)

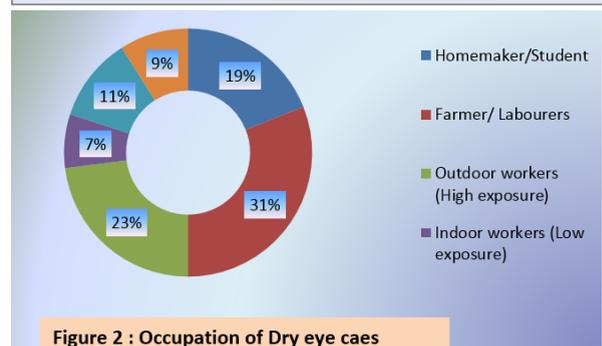


Figure 2 : Occupation of Dry eye caes

DISCUSSION:

Dry eye is one of the commonly encountered ocular morbidities seen by ophthalmologists in general practice. It is common in this part of India especially during summers when the climate is dry and hot. The disease is ignored commonly because of nonspecific symptoms and so the exact prevalence of this condition is not estimated precisely. The diagnostic accuracy of various subjective and objective methods varies a lot. The overall incidence of dry eye patients diagnosed in our study is 6.55% which is much lower than the study done at West Bengal¹⁵ where it was around 54% and the study conducted by Bhutia et al¹⁴ in Sikkim where it was around 12.7%. Thus the proportion of dry eyes varies in different geographical locality.

In our study, relatively higher numbers of female are affected in all age groups as compared to male with overall female: male ratio 2.7:1. This was very similar to other studies where females were affected more than male¹⁵. Various literatures support this finding. A study from United Kingdom suggests

that evaporation of tear film is significantly higher in elderly and females because of the thinner and less efficient lipid layer in the tear films which is required to prevent the evaporation of tear films¹⁶. These findings are in concordance with the previous studies by Shaumberg et al, Moss *et al* emphasizing higher prevalence of dry eye in women and elderly^{17,18}. In this study we have also categorized the study population among tribals and non tribals and found the lesser prevalence of dry eye case in tribals (31.35%). However no such study has been performed previously to the best of our knowledge, studying the ocular disorders among the tribal population in this region of country. Dry eye cases are also common in occupationally exposed population and subjects using modern gadgets like computer and mobile. This may be due to reduced blinking rate while working on monitor for longer duration¹⁹. This is also reflected in our study where outdoor workers, students and professional together constituted more than half of the dry eye cases. This was very similar to the study by Anshu et al²⁰. In our study, number of dry eye cases in male were more in 18-60 years age group while in females this was more in above 61 years age group. This may be attributed to the outdoor activity of males and effect of post menopausal hormonal changes in female in the particular age group respectively²¹. These associations were also seen and explained in the study by Sahai et al in hospital based population from Jaipur in western part of India²².

The most common complaints of dry eye patients are burning, heaviness, stickiness, foreign body sensation, redness, itching, blurred vision, and light sensitivity. In our study, the common complaints were burning sensation, ocular discomfort, foreign body sensation, dryness and grittiness. Similar symptoms were also reported in study by Shah et al²³ and Bhutia et al¹⁴. We followed the scoring system of Khurana et al¹² in our study to classify dry eyes in mild, moderate and severe dry eyes. Here moderate dry eyes cases were way ahead of mild and severe dry eyes cases. This was very similar to the study by Choudhary et al²⁴. Most common etiology for dry eyes in our study was vitamin A deficiency in 38% cases followed by diabetes mellitus in 21%. Among other causes, computer vision syndrome also contributed in 9% of cases. Similar etiologies were also mentioned in previous studies except for computer vision syndrome, which is a new entry in the list as the modern gadgets like computer, smart phones and television are used very commonly and leads to dry eyes syndrome²⁵.

The procedures used for the diagnosis were safe and no side effects were seen in any of the participant while performing Schirmers test and TBUT. Result from questionnaire and the tests correlated well in this study.

Limitations of the study: Sample size and duration of study was small in the study thus the study does not necessary represent the result for entire population.

CONCLUSION:

Though dry eye is a frequently encountered entity for general practitioners and ophthalmologists, but still it is under-diagnosed due to lack of specificity of symptoms. Lack of definitive diagnostic tests and time consuming questioners methods making it more complicated and confusing. Most of the cases are due to occupation related and normal aging process. Proper counseling of the patients regarding the chronic nature disease with long term treatment and preventive measures are necessary to relieve ocular discomfort and ensure patient satisfaction with a better quality of life.

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