DRY EYE- PREVALENCE AND ATTRIBUTABLE RISK FACTORS IN A HOSPITAL-BASED POPULATION

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ABSTRACT

BACKGROUND

Dry eye is a multifactorial disease of the tears and ocular surface that results in symptoms of discomfort, visual disturbance and tear film instability with potential damage to the ocular surface.

The aim is to study the prevalence of dry eye and evaluate various risk factors attributable to dry eye in a hospital-based population.

MATERIALS AND METHODS

A hospital-based population study was performed. In this cross-sectional study, 150 patients above 20 years of age of either sex, presenting with various ophthalmic complaints, were screened for dry eye who presented to the Department of Ophthalmology, Rajah Muthiah Medical College and Hospital, Annamalai Nagar, Chidambaram, between May 2015 and November 2017. Patients were included based on a standardised validated dry eye questionnaire, underwent various tests including tear breakup time (TBUT), Schirmer's test, Rose Bengal staining and presence of strands and/or filaments in either/both eyes.

RESULTS

The prevalence of dry eye was 16%. It was significantly higher in males (16.4%) than in females (15.5%). Dry eye prevalence was maximum in those above 60 years of age (36.4%) followed by the age group 41-60 years (17.9%). Those with other refractive conditions constituted 46.67%, emmetropia 34%, myopia 8%, hypermetropia 6% and astigmatism 5.33%.

CONCLUSION

Dry eye is an underdiagnosed ocular disorder. The multifactorial aetiopathogenesis explains by itself why the clinical diagnosis of dry eye remains a challenge. Reduction in modifiable risk factors of dry eye is essential to reduce its prevalence.

KEYWORDS

Dry Eye, Tear Film Break-Up Time, Schirmer's Test, Rose Bengal Staining, Dry Eye Questionnaire.

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BACKGROUND

Dry eye is a multifactorial disease of the tears and ocular surface that results in symptoms of discomfort, visual disturbance and tear film instability with potential damage to the ocular surface. It is accompanied by increased osmolarity of the tear film and inflammation of the ocular surface.¹ The prevalence of dry eyes varies from 10.5% to 66.6%, thereby exhibiting wide range of disparity.²⁻⁴ Much of this difference arises 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. Our aim was to determine dry eye prevalence, evaluate risk factors attributable to dry eye in a hospital-based population.

MATERIALS AND METHODS

In this cross-sectional study, 150 patients above 20 years of age presenting to the Department of Ophthalmology, Rajah

Muthiah Medical College and Hospital, Annamalai Nagar, Chidambaram, between May 2015 and November 2017 were screened for dry eye. The patients were selected randomly and informed about the nature of the study. Patients suffering from acute ocular infections with extensive corneal or conjunctival pathology, contact lens users and those who had undergone extraocular or intraocular surgery within six months of the screening were excluded.

A general (history of systemic diseases pertaining to dry eye) and ophthalmic history, along with patient details, was elicited. Informed consent was obtained from subjects recruited for the study. A validated thirteen-item questionnaire suggested by T. Hikichi A. Yoshida et al.⁵ in which symptoms relating to dry eye was used: ocular fatigue, watering, foreign body sensation, non-sticky discharge, heavy sensation, dry sensation, discomfort, ocular pain, watering, temporary blurring of vision (improved on blinking), itching, redness, photophobia and burning sensation. A positive response is noted when the patient had that symptom occasionally, often or all the time, and negative response when the symptom occurs rarely or never. The total symptom score was calculated. Exposure to sunlight/high temperature, excessive wind, air pollution, smoking and drugs was enquired.

A brief systemic and ocular examination was carried out. Ocular examination included recording visual acuity, condition of lids and lid margins for irregularity, infection, tear

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meniscus height, tear film debris, conjunctiva and corneal surface for superficial punctate keratitis, strands, filamentary keratitis.

Objective tests (under room temperature conditions) included Rose Bengal staining, Schirmer's test and tear film breakup time (TBUT). Pre-cut strips for these tests were procured from a common source to ensure uniformity.

The Criteria for Diagnosis of Dry Eye were

- A symptom score of more than 3,
- Schirmer's test value of <5 mm in 5 minutes,
- TBUT of < 10 seconds,
- Rose Bengal staining score of > 3.5,
- Presence of strands and/or filaments in either/both eyes.

If three or more of the above five tests were positive, the subject was deemed to be suffering from dry eye.

Statistical Analysis

All variables were registered in Excel worksheet (Microsoft Office 2007). All the subjects were evaluated at the baseline and after 3 years. The statistical analysis was carried out with SPSS Version 16.0 Software. All the data was presented as mean, standard deviation and percentage of efficacies. Chi-square test is used to evaluate the statistical significance. In this study, significant statistical difference has been accepted if the P value is <0.05.

RESULTS

In the present study, dry eye prevalence was found on the rise with increase in age and is statistically significant ($p < 0.05$).

	Number of Subjects	Percentage
Gender (in Years)		
21-40	72	48.0
41-60	56	37.3
>60	22	14.7
Sex		
Male	72	48.0
Female	78	52.0
Occupation		
Farmer/Labourer	35	23.3
Others with high exposure (Salesman, mechanic, cook, driver, etc.)	24	16.0
Homemaker, student	79	52.7
Others with low exposure (Retired person, teacher, etc.)	12	8.0
Table 1. Baseline Characteristics (n = 150)		

The above Table 1 reveals baseline characteristics of study sample in the age group above 60 years (14.7%). The next age group was 41-60 (37.3%) followed by 21-40 years (48.0%). Table 2 reveals the prevalence of dry eye in males (16.4%) and females (15.5%). The overall prevalence of dry eye is 16%; $p < 0.05$, statistically significant.

	No. of Subjects	Dry eye Subjects	Prevalence (%)	P value
Gender (in years)				
21-40	72	6	8.3	0.002
41-60	56	10	17.9	
>60	22	8	36.3	
Sex				
Male	72	12	16.4	0.818
Female	78	13	15.5	
Table 2. Prevalence of Dry Eye According to Age and Sex				

	No. of Subjects	Dry eye Subjects	Prevalence (%)	P value
Occupation				
Farmer/Labourer	35	6	17.1	0.977
Others with high exposure (Salesman, mechanic, cook, driver, etc.)	24	5	20.8	
Homemaker, student	79	10	12.6	
Others with low exposure (Retired person, teacher, etc.)	12	3	25.0	
Table 3. Prevalence of Dry Eye in Various Occupational Groups				

The above table illustrates the occupations of the study groups. Farmers/labourers showed a prevalence of 17.1%; others with high exposure (salesman, mechanic, cook, driver, etc.) 20.8%; homemakers and students 12.6% and those with low exposure (teacher, retired person, etc.), 25.0% ($P > 0.05$). Of these, the prevalence of dry eye was highest.

Postmenopausal woman showed dry eye prevalence of 7/30 (23.3%) which is statistically not significant ($OR = 1.66$).

Individuals like Mechanics, field workers and Salesman were the most affected with dry eye 5/24 (20.83%), followed by farmers and labourers 6/35 (17.4%). In our study population of 150 patients, the association of different occupations with prevalence of dry eye was not significant statistically.

Although exposure factors had a higher propensity of risk in developing dry eye like excessive wind, high temperature, sunlight, smoking and drug exposure, the prevalence of dry eye in this study was not significant ($OR = 1.53$). Smokers had a prevalence of 2/9 (22.22%), considered as a modifiable attributable risk factor.

Commonly used drugs were Antihistamines and bronchodilators, anti-allergic eye drops, anti-glaucoma eye drops, corticosteroid eye drops.

DISCUSSION

Out of 150 patients, our study revealed that the prevalence of dry eye was 16%. In 2005, Sahai A and Mallik P⁶ in their study showed the prevalence to be 18.4%, while a similar study about dry eye by Moss SE et al in 2000⁷ had an overall prevalence of 14.4%.

In the present study, dry eye prevalence was found on the rise with increase in age and is statistically significant ($p < 0.05$). The study is consistent with the observation made by Moss SE et al⁷ and Lee AJ et al in 2002⁸ who reported significant increase in the prevalence of dry eye with increasing age ($p < 0.001$).

Although most studies reported an increased prevalence of dry eye in females than males, this study showed a higher prevalence among males (16.4%). A study done in 2002 by Lee AJ et al⁸ found the prevalence to be 1.4 times higher for men than women. Likewise, Schein OD et al in 1997⁹ concluded the prevalence of dry eye was common in elderly, did not find an association between race and sex in their population-based study sample.

In our study population of 150 patients, the association of different occupations with prevalence of dry eye was not significant statistically. Occupations either in agricultural or within industrial areas were not associated with the risk of dry eye symptoms as similarly observed in 2002 by Lee AJ et al⁸ in their study.

None of the risk factors that may attribute to dry eye were found to be statistically significant in this study.

A similar study conducted in Indonesia by Lee AJ et al⁸ stated that increased sunlight exposure may increase the frequency of dry eye symptoms whereas the high humidity prevalent in the equatorial region could be protective.

In our study, the prevalence of dry eye in post-menopausal women was 23.3% which is statistically not significant (OR=1.66). Sahai A and Mallik P in their study in 2005⁶ also observed a prevalence of 22.8%, almost correlating with the present study.

Among the study sample, patients with diabetes mellitus had a prevalence of 28.5% but were not significant (OR=2.46).

In our study, the prevalence of dry eye in patients on antihypertensive drugs was 36.3% but not significant (OR=3.4). A similar observation was made in 2000 by Moss SE et al⁷ that those using angiotensin-converting enzyme inhibitors had a lower incidence of dry eye whereas those patients using calcium channel blockers, the incidence was not statistically significant.

Smokers had a dry eye prevalence of 22.2% which is not significant (OR=1.54) in our study. In 2000, Moss SE et al⁷ also had similar observation in their study that smoking history was not associated with the incidence of dry eye.

In our study, the percentage with Schirmer 1 test <5 mm was 85.71%. Miki Uchino & Murat Dogru¹⁰ et al in 2006 stated that Schirmer 1 test < 5 mm was 79.6%. They concluded that the result of Schirmer 1 test is so variable that specific limit of normal tear production cannot be set for any group and statistical relation could not be established.

Schein OD et al¹¹ in their study in 1997 concluded that a total of 11.3% (275/2432) of the population had a high Rose Bengal score for a prevalence of 2%. In the present study, a total of 44.89% (22/150) had a score >3. In the present study, prevalence of dry eye with Rose Bengal score >3.5 was 14.6% which probably was the reason for the high percentage of dry eye with a score >3.5.

The disparity in the prevalence of dry eye may be due to lack of standardisation questionnaires of dry eye or the different dry eye diagnostic criteria employed. As our study is cross-sectional, it is possible only to demonstrate that a factor is associated with dry eye and not whether the particular factor precedes the dry eye. Finally, a larger sample could have been taken to study the prevalence of dry eye as it represents the entire population from which that sample is drawn.

CONCLUSION

Dry eye is one of the leading causes of ocular discomfort. In our study, dry eye prevalence increasing progressively with age

showed a relative peak. Our study has shown higher prevalence in males as compared to females in the sample study. Exposure to excessive wind, sunlight and/or high temperature is significantly related to dry eye causation. Smoking is a modifiable risk factor in dry eye causation. The multifactorial aetiopathogenesis explains why the clinical diagnosis of dry eye remains a challenge, not only due to the wide spectrum of alterations of the ocular surface with different aetiology and pathophysiology but also due to the lack of well-standardised diagnostic test. By providing more emphasis on the importance of seeking professional help for symptoms of dry eye through public education, we can offer significant relief and perhaps, provide better quality of life.

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