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, 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 aetio-pathogenesis 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.

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/or 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).

### Table 1. Baseline Characteristics (n = 150)

<table>
<thead>
<tr>
<th>Gender (in Years)</th>
<th>Number of Subjects</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-40</td>
<td>72</td>
<td>48.0</td>
</tr>
<tr>
<td>41-60</td>
<td>56</td>
<td>37.3</td>
</tr>
<tr>
<td>&gt;60</td>
<td>22</td>
<td>14.7</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>72</td>
<td>48.0</td>
</tr>
<tr>
<td>Female</td>
<td>78</td>
<td>52.0</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farmer/Labourer</td>
<td>35</td>
<td>23.3</td>
</tr>
<tr>
<td>Others with high exposure (Salesman, mechanic, cook, driver, etc.)</td>
<td>24</td>
<td>16.0</td>
</tr>
<tr>
<td>Homemaker, student</td>
<td>79</td>
<td>52.7</td>
</tr>
<tr>
<td>Others with low exposure (Retired person, teacher, etc.)</td>
<td>12</td>
<td>8.0</td>
</tr>
</tbody>
</table>

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.

### Table 2. Prevalence of Dry Eye According to Age and Sex

<table>
<thead>
<tr>
<th>Gender (in years)</th>
<th>No. of Subjects</th>
<th>Dry eye Subjects</th>
<th>Prevalence (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-40</td>
<td>72</td>
<td>6</td>
<td>8.3</td>
<td>0.002</td>
</tr>
<tr>
<td>41-60</td>
<td>56</td>
<td>10</td>
<td>17.9</td>
<td></td>
</tr>
<tr>
<td>&gt;60</td>
<td>22</td>
<td>8</td>
<td>36.3</td>
<td></td>
</tr>
</tbody>
</table>

### Table 3. Prevalence of Dry Eye in Various Occupational Groups

<table>
<thead>
<tr>
<th>Occupation</th>
<th>No. of Subjects</th>
<th>Dry eye Subjects</th>
<th>Prevalence (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmer/Labourer</td>
<td>35</td>
<td>6</td>
<td>17.1</td>
<td></td>
</tr>
<tr>
<td>Others with high exposure (Salesman, mechanic, cook, driver, etc.)</td>
<td>24</td>
<td>5</td>
<td>20.8</td>
<td>0.977</td>
</tr>
<tr>
<td>Homemaker, student</td>
<td>79</td>
<td>10</td>
<td>12.6</td>
<td></td>
</tr>
<tr>
<td>Others with low exposure (Retired person, teacher, etc.)</td>
<td>12</td>
<td>3</td>
<td>25.0</td>
<td></td>
</tr>
</tbody>
</table>

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 (22.2%), 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 P in their study showed the prevalence to be 18.4%, while a similar study about dry eye by Moss SE et al in 2000 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 al and Lee AJ et al in 2002 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 al\(^{8}\) found the prevalence to be 1.4 times higher for men than women. Likewise, Schein OD et al in 1997\(^{9}\) 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 al\(^{8}\) 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 al\(^{8}\) 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 2005\(^{6}\) 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 al\(^{7}\) 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 al\(^{7}\) 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 Dogru\(^{10}\) 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 al\(^{11}\) 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 aetiology 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.

ACKNOWLEDGEMENT
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REFERENCES