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Research Article

INCIDENCE AND RISK FACTORS FOR DRY EYE DISEASE IN A TERTIARY HOSPITAL IN NORTH CENTRAL INDIA

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ABSTRACT

Objectives: Dry eye disease (DED is a severe tear insufficiency condition that affects millions of people worldwide. Dry eye refers to conditions of the tear film brought on by decreased tear production and/or excessive tear evaporation. The study's objective was to compile data on the incidence of DED and associated risk factors.

Methods: The government hospital of Uttar Pradesh (India) served as the study's site for this cross-sectional and observational study. Clinical observation and the ocular surface disease index survey were used to assess the aim of the study.

Results: Patients were screened in total, 652. The incidence of DED was reported in 267 (40.9%) individuals. There were 130 DED patients (48.7%) above the age of 40, followed by those between the ages of 21 and 40 (47.2%). Both genders were equally impacted, with men (50.2%) and women (49.2%). Out of 267 DED patients, 128 (47.9%) had a desk job with a computer. Among the patients, 57 (21.3%) had mild DED, 74 (27.7%) had moderate DED, and 136 (50.9%) had severe DED. The severe DED also showed independent association between the desk job with a computer (Odds Ratio [OR]; 2.782, 95% confidence interval [CI]: 1.694–4.568, p<0.001), cigarette smoking (OR; 1.849, 95% CI: 1.135–3.014, p=0.014), and use of contact lens (OR; 1.972, 95% CI: 1.206–3.223, p=0.007).

Conclusion: The frequency of DED is high in Uttar Pradesh. The illness is particularly prevalent in older people, computer-using desk workers, smokers, and contact lens wearers.

Keywords: Dry eye, Ocular surface, Dry eye disease, Contact lens, Tear Film.

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INTRODUCTION

Dry eye disease (DED) is a heterogeneous condition of the ocular surface which manifest symptoms of pain, visual loss, instability of the tear film, and the possibility of surface damage. It is linked to ocular surface inflammation and a rise in the osmolarity of the tear film [1].

Patients with DED report subjective symptoms and discomfort that are poorly correlated with the results of objective clinical tests [2]. The question-based survey on the ocular surface disease index (OSDI) from California relies on symptoms rather than clinical testing for the diagnosis and grading of DED [3-5].

In several nations around the world, the prevalence of DED has been observed, with a range of between 9.5 and 90% [6-15]. Hospital-based studies in populations from various regions of India revealed a range of 18.4–40.8% incidence of dry eye [16-20]. However, there is a dearth of information about the possible influence of race or ethnicity on the emergence of dry eyes. Numerous epidemiological studies employ various definitions of dry eye, some of which may not be consistent. There is a need to broaden epidemiological investigations employing standardized questionnaires and standardized diagnostic criteria to broader geographical areas. Only a few numbers of publications have provided a brief discussion on the epidemiological data of DED from the Indian subcontinent [17-19,21,22]. The primary objectives of the study were to assess the incidence of DED according to the OSDI questionnaire and to assess the risk factors associated with it.

METHODS

Patients and sample specimens

This cross-sectional study was carried out at the outpatient ophthalmology department of a Medical College in Uttar Pradesh, India, in between March 2020 and February 2022. The study adhered to the guidelines of the Indian Council of Medical Research and informed consent was obtained from each participants. Systematic random sampling was used to select the study's initial patient at random, after which every third patient was added to the study and given a clinical diagnosis. All consenting volunteers over the age of 18 were enrolled in research. Patients who were under the age of 18 or refused to give permission were not included in the research.

Ocular surface disease score (OSDI score)

Before calculating the OSDI score, oral informed agreement was taken. Only patients ready to submit to objective tests provided written consent. All patients provided detailed histories, with an emphasis on information related to dry eye. In addition, information regarding use of visual display terminals such as television, laptops, tablets, and mobile was gathered and examined.

The OSDI questionnaire was given to each patient who participated in the study. Patients who did not speak English were given explanations of the questions in their native language. The item on the OSDI questionnaire received a score between 0 (never) and 4 (always) (all of the time). Based on how long their symptoms persisted during the previous week, the patients were required to give them a score. The total of all the scores was multiplied by 25 to determine the final score,

which was then divided by the number of questions correctly answered. Scores range from 0 to 100 in which 0–12 indicating normal, 13–22 indicating mild DED, 23–32 indicating moderate DED, and more than 33 indicating severe DED [5].

Statistical analysis

All statistical analyses under this study were performed using IBM-Statistical Package for the Social Sciences (SPSS) Statistics 25.0 (SPSS, Chicago, IL, USA). The Chi-square test and Fischer's exact test were used to determine the connection between categorical data. A bivariate logistic regression analysis was used to get the odds ratio. Statistics were deemed significant at $p<0.05$.

RESULTS

Demographic presentation of eye disease patients

A total of 652 patients who visited the outpatient department with various ophthalmic issues had their eyes examined for the dry eye. Over the course of 2 years, the OSDI questionnaire was given to a total of 652 patients. Patients in this cross-sectional study had a mean age of 43.08±14.69 years. Patients were further classified into three age groups: Below and equal to 20 years, 21–40 years, and above 40 years. In the present study, there were n=328 (50.3%) male patients and n=324 (49.7) female patients were identified. Clinically, significant DED was found in 267 (40.9%) out of 652 individuals. Of these, 136 (50.9) had severe DED, 74 (27.8%) had moderate DED, and 57 (21.3%) had light DED (Fig. 1).

The demographic presentation of DED patients

Table 1 provides a description of the patients' demographic information who had DED. The majority of DED patients 130 (48.3%) were found to be older than 40 years, while 126 (47.2%) were between the ages of 21 and 40 years. With DED, gender bias was not observed and gender distribution is equal. 148 (55.4%) DED patients belong to rural residence while 119 (44.6%) patients belong to urban residence. The distribution according to occupation showed that 128 (47.9%) patients were desk employees who used computers while 139 (52.1%) were field workers or homemakers. The incidence of mild and moderate DED was identified in 137 (51.3%) patients, compared to 130 (48.7%) of those with severe DED.

Mean OSDI score with age group

The majority of research indicated a significant and favorable correlation between the mean OSDI score and older age group. The average OSDI score was found to be 23.28±6.83, 33.91±13.23, and 39.52±18.44 with age groups of ≤20 years, 21–40 years, and more than 40 years, respectively (Table 2).

Identification of the associated risk factor with severity of DED

The risk factors connected to the emergence of severe DED underwent a bivariate regression analysis. Significant correlations between age, occupation, cigarette smoking, and contact lens use and severe DED were found (Table 3). There was no difference in the illness severity between gender (p=0.245), residence (p=0.83), alcoholism (p=0.302), and steroid use (p=0.431).

Logistic regression analysis showed a persistent independent connection between age groups 20–40 years (Odds Ratio [OR]: 9.385, 95% Confidence Interval [CI]: 1.16–75.504, p=0.035) and >40 years (OR: 10.968, 95% CI: 1.364–88.164, p=0.024) for the prevalence of severe DED. The presence of a computer-related desk job (OR: 2.782, 95% CI: 1.694–4.568, p<0.001), cigarette smoking (OR: 1.849, 95% CI: 1.135–3.014, p=0.014), and contact lens use (OR: 1.972, 95 % CI: 1.206–3.223, p=0.007) was also independently associated with severe DED.

DISCUSSION

One of the most common ophthalmic conditions, DED may have a negative effect on a person's daily routine of life. Along with producing a multitude of debilitating symptoms may affect the cornea and causing cataract. For the purpose of identifying dry eye and grading its severity, several objective tests have been devised. Nevertheless, these tests have a low repeatability, a large interobserver variability, and a poor correlation with disease symptoms and the quality of life [2-4].

The questionnaires based on the patient report are an effective tool for DED screening, monitoring, and management [5,23]. In agreement with the Food and Drug Administration patient-reported outcome criteria, there are currently two validated, proforma available: OSDI and the impact of dry eye on everyday life questionnaire [5,23-27]. The OSDI questionnaire served as the primary screening tool in our study for patients. It is suitable for clinical application in the outpatient department due to its quicker completion time, patients' ease of comprehension, and lack of additional costs [5,26,27].

According to the OSDI questionnaire, our study found that 40.9% of participants had dry eyes. The DED prevalence varies from 18.4% to 54.3% in India, which is greater than the global prevalence [21,28]. Due to endemic geographic variances and the use of diverse research' various diagnostic criteria, there is a significant disparity in the

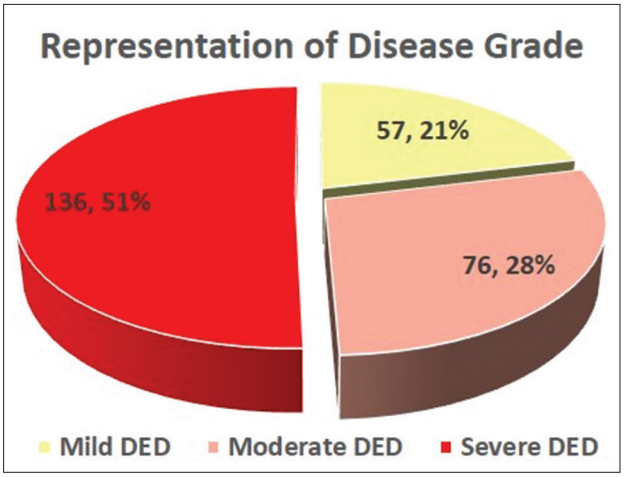

Fig. 1: Distribution of patients with DED grade

Table 1: Demographic details of the DED patients

Variable	Number of Patient (%)
Age group	
≤20 Years	11 (4.1)
21–40 Years	126 (47.2)
>40 Years	130 (48.7)
Gender	
Male	134 (50.2)
Female	133 (49.8)
Residence	
Rural	148 (55.4)
Urban	119 (44.6)
Occupation	
Desk Job with computer	128 (47.9)
No desk Job	139 (52.1)

Table 2: Representation of the mean OSDI score with age group

Age group	Number of DED patients	Mean±SD	95% CI for mean		p-value
			Lower	Upper	
≤20 Years	11	23.28±6.83	18.69	27.87	<0.001
21–40 Years	126	33.91±13.23	31.58	36.24	
>40 Years	130	39.52±18.44	36.32	42.72	

Table 3: The logistic regression analysis for factors associated with severity of DED

Risk factor (s)	Odds ratio	95% CI		p-value
		Lower	Upper	
Age group				
≤20 Years	1	-	-	-
21–40 Years	9.385	1.166	75.504	0.035
>40 Years	10.968	1.364	88.164	**0.024**
Gender				
Female	1	-	-	-
Male	1.331	0.822	2.153	0.245
Residence				
Rural	1	-	-	-
Urban	1.537	0.946	2.497	0.083
Occupation				
No desk Job	1	-	-	-
Desk job with computer	2.782	1.694	4.568	**<0.001**
Smoking				
No	1	-	-	-
Yes	1.849	1.135	3.014	**0.014**
Alcoholic				
No	1	-	-	-
Yes	1.288	0.796	2.084	0.302
Contact Lens User				
No	1	-	-	-
Yes	1.972	1.206	3.223	**0.007**
Steroid User				
No	1	-	-	-
Yes	1.213	0.750	1.962	0.431

Reference category: Mild and moderate DED

prevalence of DED. Furthermore, we solely used symptoms to determine the prevalence of DED, which could have led to an overestimation of the condition's frequency.

In line with findings from other dry eye studies, the incidence of dry eye augmented gradually with increasing age in our study, and the mean OSDI score increased with each subsequent age group [17,18]. According to our study, the incidence was roughly similar in age groups of 21–40 and >40. This increase incidence of dry eye brought by environmental exposure, with the working age group being utmost susceptible because they are the most active in their jobs. The functional loss of the Meibomian gland in the older population is also linked to aging and causes inadequate lipid layers and unstable tear films [29].

Most research indicated that dry eyes are more common in women than men [9,30]. In the current study, dry eyes were reported by 50.2% of males and 49.8% of women. This tendency may be elucidated by the fact that women in developing countries are less likely to seek medical care since our study was conducted in a hospital [31]. The risk of severity of disease was significantly enhanced by desk employment requiring computer use. The humidity is comparatively low in air-conditioned rooms and indoor working environments damages the tear film through desiccating the eye. A substantial risk factor for DED has been identified as using a computer for a longer time period. This is mostly due to the fact that utilizing these devices causes a drop-in blink rate, which makes it more difficult to distribute the tear film evenly over the surface of eye [28,32-34]. Extended eye apertures and a greater stare angle when using a digital display cause fast tear loss, which makes the dry eye condition worse because evaporation is the primary route of tear removal. Due to an increase use of digital screens and telephones for around 8 h per day over the past 5 years, the younger generation now has a higher incidence of DED [34]. We found a strong correlation between DED and smoking as well as contact lens usage. Wearing contact lenses can degenerate or persuade DED [3,35]. Nearly 50% of people who wear contact lenses occasionally experience symptoms such as, uneasiness, less humidity of eye, irritation, grittiness, feeling of burn, or a feeling of a foreign body [3,35]. Smoking may harm stability and the sensitivity of the eye's surface, which has been linked to DED in a considerable way [36]. We found no correlation between the use of alcohol, steroids, or systemic comorbidities. The limited sample size of the present study is one of its limitations. The future research can be conducted using a bigger sample size and other impartial DED tests.

CONCLUSIONS

In Uttar Pradesh (North Central India), we found that the prevalence of DED was 40.9%. With advancing years of age, the prevalence of DED patients increased. Smoking, wearing contact lenses, and desk jobs involving computer use all raised the risk of acquiring DED. To minimize eye discomfort and provide patients contentment with an improved quality of life, long-term therapy, preventative measures, and is necessary to fully inform patients about the chronic nature of their ailment.

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AUTHOR'S CONTRIBUTION

Dr. K.M. Verna has finalized the draft and guarantor, Dr. M. Govila has prepared the conceptual framework, designing of draft, and data analysis, Dr. H.S. Neyaj was involved in data collection and manuscript writing, and Dr. R. M. Prasot has done data collection and data analysis.

CONFLICTS OF INTEREST

None declared.

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None.

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