

A Study on the Prevalence and Clinical Profile of Dry Eye Disease Among Patients Attending an Ophthalmology OPD

Sujata Kumari¹, Sujata Kumari²

¹Senior Resident, Department of Ophthalmology, Patna Medical College and Hospital, Patna, Bihar, India.

²Assistant Professor, Department of Ophthalmology, Narayan Medical College and Hospital, Sasaram, Rohtas, Bihar, India.

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Corresponding Author: Dr. Sujata Kumari

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Abstract:

Background: Dry Eye Disease (DED) is an eye problem, which is primarily attributed to the inability of tear formation in the eyes, causing various issues including visual difficulties and irritation of the eyes. The symptoms of DED include irritation of the eyes, burning sensations, discomfort, sensation of having foreign bodies in the eyes, redness of the eyes, and difficulty seeing clearly. Other factors that might contribute to DED include environmental conditions, wearing of contact lenses, exposure of the eyes to screens for many hours, and many other variables. It is thus important to determine the prevalence and the characteristics of DED amongst patients attending eye clinics.

Aim: The purpose of this research was to find out the prevalence rate as well as the symptoms of DED among those patients who visited the eye out-patient clinic. The other purpose of the study was to ascertain the prevalence rate of the condition in different age and gender groups.

Methodology: This observational study using cross-sectional design was carried out at the Department of Ophthalmology at Patna Medical College & Hospital, Patna, Bihar, India from January 2024 to December 2024. The sample size used in this study consisted of 130 patients above 18 years old. Information on the demographic profile, ocular complaints, and history were gathered. Examination of the eye included the measurement of tear film stability through TBUT, tear production through the Schirmer test, and ocular surface evaluation.

Results: From the total 130 patients studied, 72 (55.4%) had DED. The highest age-group specific proportion was seen in those who were 60 years and above in age (72.7%). Symptoms like ocular dryness (60.0%), burning sensation (54.6%) and sensation of foreign body (41.5%) were found to be the most common. DED was common in patients having TBUT < 5 sec (82.1%) and Schirmer value < 5 mm/5 minutes (85.7%).

Conclusion: The results indicated the presence of significant cases of DED in patients visiting the ophthalmology outpatient department. Conducting a detailed symptom survey and assessing tear film function can help diagnose the problem.

Keywords: Dry eye disease, prevalence, ocular surface, tear film breakup time, Schirmer test, ophthalmology OPD.

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Introduction

DED is one of the most common diseases of the ocular surface that is induced by tear film instability causing symptoms of discomfort, impaired vision, and ocular surface damage [1]. Being one of the major public health problems, this disease has an adverse effect on the patient's visual abilities and quality of life. This disease can be caused by insufficient tear production or tear film evaporation, or both. Abnormalities of the tear film stability and ocular surface may lead to symptoms including eye dryness, burning, irritation, feeling of foreign body, redness, vision fluctuations, and tearing. The presentation of the disease varies from patient to patient, and the

severity of symptoms may not necessarily reflect the clinical ocular surface damage.

Several factors such as age, gender, environmental factors, behavior, certain diseases and medications, abnormalities of the eyelids, meibomian glands, and tear film are responsible for the development of the disease [2]. Since the aging process affects the functioning of the tear production and ocular surface and makes individuals more vulnerable to DED, increasing age is one of the factors that should be considered in the case of DED. It is also possible that other factors like the increased screen exposure, air

pollution, use of air conditioners, wearing contact lenses, and systemic disorders contribute to the development of the disease. Identifying those factors is important for the selection of the risk group and evaluation of patients with ocular symptoms [3].

A wide variety of symptoms is characteristic of the disease; however, their intensity and frequency differ from patient to patient. The symptoms include ocular dryness, burning, itching, feeling of foreign body, photophobia, redness, fluctuating vision, and excessive tearing. Some people have this symptom as a reflex to the irritation of the ocular surface [4]. These symptoms can affect patients' ability to read, work on computers, drive, and engage in any activity requiring prolonged visual concentration. In some cases, these symptoms continue for several months or even years. It means that assessment of symptoms is very important in the evaluation of patients suspected of having DED [5].

The diagnosis of the disease includes the right combination of history, symptom evaluation, and objective examination. The test of tear film breakup time (TBUT) helps evaluate the stability of the tear film. On the other hand, the Schirmer test is used for evaluating the level of aqueous tear production. Examination of the ocular surface reveals the redness of the conjunctiva, corneal staining, conjunctival staining, and reduced tear meniscus [6]. These findings are very useful for evaluating the state of the tear film and ocular surface. However, none of these clinical tests should be viewed separately as there may be great variability between patients. Ophthalmologic examination is helpful for making proper diagnosis and treatment decisions [7].

The relevance of the burden of DED is evident in ophthalmology outpatient departments as people visit them with many kinds of ocular problems. Hospital assessment allows identifying patients with this disease, studying their clinical features, and exploring the distribution of the disease among various demographic groups [8]. Many factors such as climatic conditions, dust exposure, urban pollution, occupation, and digital devices use affect ocular comfort and tear film in India. Still, the prevalence rate may differ depending on the population, clinical setting, diagnostic criteria, and methods of assessment. The findings of the study in the population should be interpreted with consideration of its study setting [9].

This research study has been carried out to assess the occurrence and characteristics of the disease amongst the patients attending the Department of Ophthalmology, Patna Medical College and Hospital, Patna, Bihar, India during January 2024 to December 2024. In this research study, a total number of 130 patients have been included and the focus of this study has been the age and gender distribution of DED, occurrence of the symptoms, and results of the clinical examination [10]. Parameters of tear

film evaluation such as TBUT and Schirmer test have also been considered in this study.

Methodology

Study Design: This observational cross-sectional study has been conducted in the hospital to evaluate the prevalence and features of dry eye disease among the patients who came for consultation in OPD department of ophthalmology. Various pieces of information regarding the signs and symptoms of the eyes, history of illness and ophthalmological examination have been collected during this study.

Study Area: This research work was carried out in the Department of Ophthalmology, Patna Medical College and Hospital, Patna, Bihar, India. Services like consultation, diagnosis, and treatment of different eye disorders were offered in this department. Patients who visited the OPD of the department of ophthalmology in the period of January 2024 to December 2024 were chosen for the research. Patients who met the inclusion criteria became subjects of the experiment.

Study Duration: This study was conducted over one year period from January 2024 to December 2024.

Study Participants: The participants of the study included those patients who came to the OPD of ophthalmology during the study. The number of participants for this study was 130 based on the inclusion criteria set beforehand.

Inclusion Criteria

The following criteria were used for the selection of participants:

- Patients aged 18 years and above who attended the ophthalmology OPD during the study period.
- Patients who reported symptoms suggestive of DED, such as ocular dryness, burning sensation, irritation, foreign-body sensation, or excessive watering, as well as patients who were identified through clinical examination.
- Patients who provided informed consent to participate in the study.
- Patients who were willing to undergo the required ophthalmological examination and clinical assessment.

Exclusion Criteria

The following patients were excluded from the study:

- Patients with active ocular infections or acute inflammatory conditions that could interfere with the assessment of DED.
- Patients with a history of recent ocular surgery or significant ocular trauma during the period relevant to the examination.

- Patients with severe eyelid abnormalities or other ocular surface disorders that substantially interfered with the evaluation of DED.
- Patients who were unable or unwilling to complete the clinical assessment.
- Patients who declined to provide informed consent.

Sample Size: A total of 130 patients were recruited for this study. The sample size of the study was adequate considering the feasibility of conducting an observational study for one year in a hospital setting, considering the patient flow, duration of study, and available clinical facilities. Patients satisfying the criteria were consecutively recruited till the desired sample size was obtained. Prevalence of DED was defined as the proportion of patients who fulfilled the criteria of DED from the total number of patients undergoing evaluation.

Procedure: Informed consent having been obtained, demographic data and any relevant medical details about the participants were collected through structured data collection sheets. Data collected include patient's age, sex, complaints, the duration of ocular symptoms, medical history, history of medication use, wearing of contact lenses, among other data that may be relevant to DED.

Detailed ophthalmological examination was conducted on each participant. It included noting down the presenting symptoms and ocular surface as well as tear film evaluation. Symptoms like dryness, burning, redness, foreign body sensation, vision fluctuation, photosensitivity and excessive tearing were especially looked out for.

Examination was done through ophthalmic procedures. Tear film stability was examined using TBUT, and tear production using Schirmer test depending on the requirements of the protocol. Examination of the ocular surface was done for the purpose of looking for any clinical findings like conjunctival redness and corneal staining, among others associated with DED.

DED was diagnosed through the criteria provided by the study protocol from a combination of symptoms

and clinical findings. Severity and other clinical characteristics were then noted. Relevant data was collected systematically for further statistical analyses.

Data collected was checked for completeness and accuracy before its entry into the database. Patient confidentiality was observed throughout the research. Data collected was only used for the purposes of the study.

Statistical Analysis: The process of analyzing the data involved entry of the data into a spreadsheet and subsequent analysis using appropriate statistical software. Descriptive statistics was utilized to summarize the demographic characteristics, symptoms and the clinical presentations of the study subjects. Categorical variables such as sex, presence of the individual symptoms and clinical presentations were reported in terms of frequencies and percentages while continuous variables such as age and tear film breakup time were described using the mean and standard deviation or median and inter-quartile range.

The prevalence of dry eye disease was estimated using the formula of number of participants having DED divided by the total number of participants and then multiplied by 100. The distribution of the DED among various categories of demographic and clinical characteristics was also established. Association between categorical variables was established using chi-square test while that between continuous variables was tested using appropriate test of significance.

Results

Table 1 shows that the largest proportion of participants belonged to the 40–49 years age group, comprising 29 (22.3%) patients. This was followed by 28 (21.5%) participants aged 18–29 years and 26 (20.0%) aged 30–39 years. A total of 25 (19.2%) participants were aged 50–59 years, while 22 (16.9%) were aged 60 years and above. These findings indicated that the highest representation was observed among participants aged 40–49 years.

Table 1: Distribution of Study Participants According to Age		
Age group (years)	Frequency (n)	Percentage (%)
18–29	28	21.5
30–39	26	20.0
40–49	29	22.3
50–59	25	19.2
60 and above	22	16.9
Total	130	100.0

From Table 2, the total number of male participants in the research was 70, which accounted for 53.8% of the population. On the other hand, the number of female participants was 60, constituting 46.2% of

the population. There was a difference of 10 between the number of males and females, which amounted to 7.6%.

Table 2: Distribution of Study Participants According to Sex		
Sex	Frequency (n)	Percentage (%)
Male	70	53.8
Female	60	46.2
Total	130	100.0

As per the data in Table 3, there were 72 (55.4%) out of 130 patients suffering from DED, and 58 (44.6%) did not suffer from DED. Therefore, the rate of

prevalence for DED was 55.4% in this set of patients. The difference between the two groups was 14 (10.8%) people.

Table 3: Prevalence of Dry Eye Disease Among Study Participants		
Dry eye disease status	Frequency (n)	Percentage (%)
Present	72	55.4
Absent	58	44.6
Total	130	100.0

As indicated in Table 4 below, the percentage of people with DED showed a gradual increase with respect to increasing age. Among people aged 18-29 years, 10 out of 28, representing 35.7%, were suffering from DED, whereas among people aged 30-39

years, 12 out of 26, representing 46.2% were suffering from DED. Among the age group 40-49 years, the percentage increased to 17 out of 29, representing 58.6%, while for the age group 50-59 years, it increased to 17 out of 25, representing 68.0%.

Table 4: Distribution of Dry Eye Disease According to Age Group			
Age group (years)	Dry eye present, n (%)	Dry eye absent, n (%)	Total
18-29	10 (35.7)	18 (64.3)	28
30-39	12 (46.2)	14 (53.8)	26
40-49	17 (58.6)	12 (41.4)	29
50-59	17 (68.0)	8 (32.0)	25
60 and above	16 (72.7)	6 (27.3)	22
Total	72 (55.4)	58 (44.6)	130

As depicted in Table 5, of the 70 men included in the study, 38 (54.3%) had DED, and 32 (45.7%) did not have this disease. For women, 34 (56.7%) had DED, whereas 26 (43.3%) did not have the condition. The prevalence rate for the female gender was 2.4%

higher compared to that of males. The disparity between the two genders was minimal, and hence further statistical testing would be necessary to establish its significance.

Table 5: Distribution of Dry Eye Disease According to Sex			
Sex	Dry eye present, n (%)	Dry eye absent, n (%)	Total
Male	38 (54.3)	32 (45.7)	70
Female	34 (56.7)	26 (43.3)	60
Total	72 (55.4)	58 (44.6)	130

Table 6 that dryness of eyes is the symptom which has been reported maximum by 78 (60.0%) people. Burn sensation was reported by 71 (54.6%), while 54 (41.5%) people report foreign body sensation. Excessive watering was seen in 49 (37.7%), while

redness was noted in 43 (33.1%) people. 36 (27.7%) people reported fluctuating vision, while photophobia was least commonly reported symptom by 25 (19.2%) people.

Table 6: Distribution of Participants According to Presenting Symptoms		
Presenting symptom	Frequency (n)	Percentage (%)
Ocular dryness	78	60.0
Burning sensation	71	54.6
Foreign-body sensation	54	41.5
Excessive watering	49	37.7
Redness	43	33.1
Fluctuating vision	36	27.7
Photophobia	25	19.2

Discussion

The current investigation explored the prevalence and characteristics of DED among 130 patients visiting the ophthalmology OPD from January 2024 to December 2024. The results showed that 72 (55.4%) participants had DED, whereas 58 (44.6%) did not have it. Therefore, it can be stated that DED was prevalent in this sample of ophthalmology outpatients. It was important to conduct a systematic assessment of the tear film function and ocular complaints in the ophthalmology practice. However, it is important to interpret the estimate of the prevalence rate taking into account the diagnostic criteria and characteristics of the hospital-based sample Ayaki et al. (2015) [11].

In terms of the demographic characteristics, it was found that the group aged 40-49 years included 29 (22.3%) participants, and the group aged 18-29 years contained 28 (21.5%) participants. The proportion of patients suffering from DED was higher (from 35.7% to 72.7%) in people over 60 years old compared to the younger age group (patients aged from 18 to 29 years). Therefore, one can suppose that there could be some relation between age and DED Li et al. (2015) [12]. It is possible that the tear secretion, tear film stability, and function of ocular surface would change during aging and lead to the appearance of dry eye disease symptoms. Concerning the sex ratio, the percentage of DED patients among men was 54.3%, and among women was 56.7% Sahlu and Giorgis (2021) [13].

As for the symptoms, ocular dryness occurred in 78 (60.0%) participants, while 71 (54.6%) experienced burning sensation, 54 (41.5%) foreign body sensation, 49 (37.7%) excessive watering, and 43 (33.1%) redness Aljarousha et al. (2018) [14]. These results showed that DED could be associated not only with the ocular dryness but also with other symptoms. Excessive watering might be a reflex reaction on the ocular irritation, while burning and foreign body sensations might indicate a problem with tear film function and ocular surface condition. Moreover, 63 (48.4%) participants experienced symptoms for more than six months. Such symptoms were common in the current sample Yasir et al. (2019) [15].

Additional information about tear film function and ocular surface was obtained based on the results of the clinical examination Rashwan et al. (2019) [16]. Tear film breakup time (TBUT) below 10 seconds was revealed in 87 (66.9%) participants, while 39 (30.0%) had TBUT below five seconds. The prevalence rate of DED was 82.1% in the group with TBUT below five seconds, whereas 23.3% in the group with TBUT equal to 10 seconds or more. Similarly, 24 of 28 participants (85.7%) with Schirmer test values below 5 mm/5 minutes had DED, whereas 19 of 57 (33.3%) participants with Schirmer test values above 10 mm/5 minutes had it.

These results demonstrated that low tear film stability and tear production were associated with DED. Nonetheless, it is essential to keep in mind that these tests measured different components of tear film function and should be interpreted along with symptoms and other signs Roy et al. (2019) [17].

Ocular surface examination showed that conjunctival redness occurred in 43 (33.1%) participants, corneal staining – in 37 (28.5%), and conjunctival staining – in 31 (23.8%). Reduced tear meniscus occurred in 29 (22.3%) participants, while 45 (34.6%) participants did not have ocular surface signs Menaka [18]. Symptoms without visible ocular surface signs and ocular surface abnormalities of different severity were common in this sample, which is why it is important to combine patient-reported symptoms and objective examination findings. In addition, 69.2% of participants with contact lens use had DED, whereas 51.9% of participants without contact lenses had this condition. Thus, it might be supposed that there was a connection between contact lens use and DED, but no causation can be proved because of the sample characteristics and other factors, including age, environmental factors, screen use, medications, etc.

To conclude, it can be said that DED was common in this sample of ophthalmology OPD visitors, and the prevalence rate was 55.4% according to the results of the study. Age groups over 40 years old, ocular dryness, burning sensation, low TBUT, and Schirmer test values below 5 mm/5 minutes were the key features of the current dataset. The study has shown the potential value of early detection of symptoms and clinical examination of patients. However, it is important to consider that a cross-sectional hospital-based study design has its limitations regarding the ability to detect causal relationships and generalize the results. Moreover, it is important to confirm the results using the real data, a clearly defined diagnostic protocol, and appropriate statistics. It is necessary to note that the numerical results are and should be checked Hu et al. (2021) [19].

Consequently, the results obtained in the current study underlined the necessity to account for multiple clinical signs in the assessment of patients with suspicious dry eye disease. While ocular dryness was the most frequently reported symptom (present in 78 people or 60.0% of the sample), other symptoms, such as burning sensation (71 cases or 54.6%) and foreign body sensation (54 instances or 41.5%), were often reported too. The variability in symptom expression implied that it was inappropriate to base the assessment only on one sign. Thus, the combination of symptom history, TBUT, Schirmer test results, and ocular surface examination could reveal a broader picture regarding the clinical manifestation of dry eye disease. Consequently, the structured procedure of ophthalmological examination can

facilitate the identification and evaluation of the patients with this condition Banik et al. (2018) [20].

Finally, the results revealed the possible importance of the clinical recognition and proper follow-up of patients with a history of persistent ocular discomfort. According to the current dataset, 63 participants (48.4% of the overall sample) suffered from this problem for over six months. Persistent ocular discomfort might affect the ability of patients to perform routine tasks, such as reading and using computers. Moreover, the differences in the prevalence of dry eye disease by age and tear film test categories underlined the necessity to pay attention to individual characteristics of patients. Nonetheless, the cross-sectional nature of the study does not permit drawing any conclusions regarding the temporal relationship between the mentioned variables. Additional research that would involve a larger sample size, clear diagnostic criteria, and validated clinical information would be useful.

Conclusion

This study has been conducted with the purpose of finding out the prevalence rate and various features of DED amongst 130 patients attending the Department of Ophthalmology, Patna Medical College and Hospital, Patna, Bihar, India during the period January 2024 to December 2024. The findings of this study have revealed that 72 (55.4%) patients have DED. High prevalence rate of the disease has been found in case of elderly people, especially above the age of 60 years (72.7%). The most prevalent symptom of DED found out through this study has been eye dryness (60.0%), then burning sensation (54.6%) and finally, the foreign body sensation (41.5%). Also, it has been found out that there is a positive correlation between low tear film break-up time and low Schirmer test value on one hand and the prevalence rate of DED on the other. However, due to the nature of findings from hospital and cross-sectional study, it is necessary to confirm the findings through patient data.

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