Prevalence and Associated Risk Factors of Dry Eye in Muzaffarpur District of Bihar

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Abstract:

Objectives: The present study was to evaluate the prevalence and associated risk factors of dry eye disease in Patna District of Bihar.

Methods: Ophthalmic history, Systemic and ocular examination was done to all eye disease patients. These patients were handed over the two dry eye questionnaires (OSDI and DEQ 5) which had questions pertaining to the symptoms of dry eye. Scoring of the patients was done and the scores ranged as follows: OSDI – 0 to 100 and the OSDI score ≥12 was taken as positive for dry eye disease. DEQ: 5 – 0 to 22 and the score ≥ to 6 was taken as positive for dry eye disease. The Participants then underwent a comprehensive examination test sequence following the DEWS subcommittee diagnostic steps. TBUT was performed before the other dry eye tests, to avoid any untoward interference followed by ocular surface staining. The Schirmer's test was performed last so that ocular irritation by the test strip would not interfere with other examination results.

Results: Prevalence of dry eye was 43.55%. Higher prevalence of dry eye 56.27% was seen in age group of 51-65 years. prevalence of dry eye was greatly in females (47.23%). Majorities of dry eye patients 166(44.62%) was evaporative type. Farmers/labourer 167(44.89%) was greatly affected with dry eye. 87(23.38%) dry eye patients were factory workers. Most common risk factors of dry eye was smoking 164(44.08%). Others risk factors of dry eye were systemic disease 76(20.43%), systemic medication 61(16.39%), topical medication 50(13.44%), air conditioning 13(3.49%) and contact lens 08(2.15%).

Conclusions: Dry eye disease is preponderance in old age female population. Evaporative is the most common type of DED. Farmers/labourer is commonly suffered. Smoking and systemic disease are the most common risk factors of dry eye disease. Hence, Dry eye disease is a distressing problem which is often overlooked and is frequently underdiagnosed. The multifactorial etiopathogenesis and lack of specificity of symptoms explain why the clinical diagnosis of dry eye remains a challenge. It is crucial to increase awareness about this condition and continue research on DES among the population to obtain a more detailed analysis. Identifying the prevalence, symptoms and risk factors could enable the implementation of appropriate preventive measures against DED.

Keywords: Dry eye disease, Gender, Risk factor.

Introduction

Dry eye is a disorder of the tear film due to tear deficiency or excessive evaporation, which causes damage to the interpalpebral ocular surface and is associated with symptoms of ocular discomfort.'' Instability and hyperosmolarity of the tear film leads to damage to the ocular surface, which is associated with ocular symptoms [1]. It represents a multifactorial, heterogeneous disorder of the preocular tear, which results in ocular surface disease. The tear and ocular surface form a complex and stable system that can lose its equilibrium through numerous disturbing factors [2]. It is one of the most prevalent eye conditions, affecting millions of people globally. The worldwide prevalence ranges from 5% to 50%, depending on the geographic region [2].

A variety of questionnaires and clinical evaluations have been applied to understand the epidemiology

of DED, but there is significant variation between studies [3, 4]. The overall prevalence of DED ranges from 5% to 50% depending on the criteria, age, sex, and population studied [3]. In women, rates of DED have been found to be 1.33 to 1.74 times higher than in men; it is usually more common in Asian populations than in Caucasian populations, and prevalence rates increase with age.

Tear Film and Ocular Surface Society, Disease Early Warning System (TFOS DEWS II) epidemiology committee has provided a meta-analysis to determine the prevalence of dry eye based on different diagnostic criteria and stratified by age and sex [3]. The prevalence of symptomatic and clinically diagnosed dry eye was found to vary by age and sex, but only one study included young participants [3,5]. Recently, some reports have evaluated DED in younger populations [4, 6, 7]. A Japanese study evaluated 3,433 high school students between 15 and 18 years of age and found a prevalence of clinically diagnosed DED of 4.3% in boys and 8.0% in girls [5]. In China, the prevalence of DED in high school students has been found to be 23.7% [8]. Distinct risk factors may contribute to DED in this age group, including long time use of electronic devices, contact lens wear, medications (such as oral contraceptives, antidepressants, or isotretinoin derivates), and sleep deprivation [4, 9]. Epidemiological studies on multifactorial diseases such as DED are necessary to recognize underlying risk factors and shed light on possible prevention strategies and treatments.

Objectives of my study was to find out the prevalence and associated risk factors of dry eye disease in Muzaffarpur District of Bihar.

Material & Methods

The present study was conducted in the Department of Ophthalmology, Sri Krishna Medical College & Hospital, Muzaffarpur, Bihar, India during a period from January 2020 to July 2022. Entire subjects signed an informed consent, approved by institutional ethical committee.

Inclusion Criteria:

Symptoms of dry eye for more than 1 month.

• 20 years and older.
• Either sex.

Exclusion Criteria

• Patients not willing and unable to follow the instruction..
• Current ocular infection, inflammation or acute allergic conjunctivitis.
• Patients who need emergency care.
• Patients with nill screen time.

Patient Information:

The following information about the patients was obtained Environmental exposure (sunlight, dust, wind, environmental pollutants):

1. Occupation- outdoor or indoor.
2. Smoking – Current or not.
3. Exposure to air condition - Yes/No.

History regarding • Use of contact lens. • Use of topical medication - beta blockers, anti histaminics, antibiotic steroid combination, drops containing benzalkonium chloride (BAC). Medical History Information on various medical conditions and complains. • Diabetes. • Arthritis. • Thyroid problem. • Acne. Use of Systemic Medication • Antihypertensive. • Anti-diabetic. • Anti-histaminics. • Diuretics. • GI ulcer medication were noted.

Assessment Technique:

1. **Symptoms Based Assessment:** Two question-naires were used- Dry eye questionnaire 5 (DEQ-5) and Ocular surface disease index.
2. **Objective Assessment:** Measurements taken-1. Tear meniscus height (TMH), 2. Tear film break time (TBUT), 3. Fluorescein staining (Classified by NEI protocol), 4. Lissamine green stain (Van Bijsterveld Score), 5. Schirmer's test. Assessment of meibum quality on slit lamp examination.

Methods:

A total of 854 patients attending the eye OPD, meeting the inclusion criteria were enrolled. History of systemic diseases, ophthalmic history treatment history was taken. Systemic and ocular examination was done. These patients were handed over the two dry eye questionnaires (OSDI and DEQ 5) which had questions pertaining to the symptoms of dry eye. Scoring of the patients was done and the scores ranged as follows: OSDI – 0 to 100 and the OSDI score ≥12 was taken as positive for dry eye disease. DEQ: 5 – 0 to 22 and the score ≥ to 6 was taken as positive for dry eye disease. This gave the subjective burden of the disease. The Participants then underwent a comprehensive examination test sequence following the DEWS subcommittee diagnostic steps. TBUT was performed before the other dry eye tests, to avoid any untoward interference followed by ocular surface staining. The Schirmer's test was performed last so that ocular irritation by the test strip would not interfere with other examination results. The tests were done under room temperature condition in order and at 10 minutes interval to minimize reflex tearing and ocular surface changes secondary to testing. In those already using tear substitutes, dry eye tests were performed after overnight discontinuation of medication.

Diagnosis of Dry Eye

OSDI Score ≥ 12 and DEQ- 5 Score ≥ 6 (Subjective Assessment/Symptomatically Dry Eye).

Plus, any 3 out of 5 .

1. Tear meniscus height < 0.25 mm.
2. Tear film break up time < 10 seconds.
3. Ocular surface staining positive for dry eye (Score> or= 1).
4. Schirmer's test < 15 mm.
5. Meibomian gland dysfunction present (Score > or = 1).

Classification of Dry Eye

Aqueous Tear Deficiency (ATD)

1. TBUT < 10 sec.
2. Ocular surface dye staining pattern: inferior cornea and bulbar conjunctiva.
3. Tear meniscus < 0.25 mm.
4.   Schirmer's strip test < 15 mm.
5. Presence of risk factors for ATD (From those included in the study).

Evaporative Tear Deficiency (ETD)

1. TBUT < 10 sec.

2. Ocular surface staining score: interpalpebral cornea and bulbar conjunctiva.
3. Presence of meibomian gland disease.
4. Presence of risk factors for ETD (From those included in the study).

Mixed Type

Presence of characteristics of ATD and ETD (Either or all of the criteria) at the same time.

Statistical Analysis

Data was analysed with the help of MS- office software. All data was tabulated and percentages were calculated.

Results

A total of 854 eye infection patients were attended OPD, in the Department of Ophthalmology, Sri Krishna Medical College & Hospital, Muzaffarpur. Among them, 372(43.55%) eye infection patient had dry eye. Prevalence of dry eye in the present study was 43.55%.

Out of 372 dry eye patient, 201(54.03%) patients were males and 171(45.97%) patients were females.

Table 1: Age wise prevalence of dry eye patients.

Age group (Years)	No. of patients	No. of dry eye patients	Prevalence of dry eye
20-35	101	27(7.26%)	26.73%
36-50	142	55(14.78%)	38.73%
51-65	311	175(47.04%)	56.27%
>65	300	161(43.28%)	53.66%
Total	854	372(100%)	43.56%

In the present study, majorities of dry eye patients 175(47.04%) were in age group of 51-65 years. 161(43.28%) patients were in age group of >65 years. Rate of prevalence of dry eye 56.27% was greatly seen in age group of 51-65 years. Overall rate of prevalence of dry eye was 43.56%.

Table 2: Gender wise prevalence of dry eye patients

Gender	No. of eyes infection patients	No. of dry eye patients	Prevalence of dry eye
Male	492	201	40.85%
Female	362	171	47.23%
Total	854	372	43.55%

In the present study, rate of prevalence of dry eye was greatly seen in females (47.23%). And in male, it was 40.85%.

Table 3: Type of dry eye diseases

Type	No. of patients	Percentage
Evaporative	166	44.62%
Aqueous deficiency	86	23.11%
Mixed	120	32.25%
Total	372	100%

In the present study, majorities of dry eye patients 166(44.62%) was evaporative type. Aqueous deficiency was seen in 86(23.11%) dry eye patients. Mixed type dry eye was seen in 120(32.25%) patients.

Table 4: Occupation wise distribution of dry eye patients.

Occupations	No. of dry eye patients	Percentage
Home Makers	56	15.05%
Farmers/Labourer	167	44.89%
Office worker	35	9.41%
Factory worker	87	23.38%
Students	19	5.10%
Non-Specific	8	2.15%
Total	372	100%

In the present study, farmers/labourer 167(44.89%) was greatly affected with dry eye. 87(23.38%) dry eye patients were factory workers. 56(15.05%) dry eye patients were home makers. Others dry eye patients were office worker 35(9.41%), students 19(5.10%) and non-specific 8(2.15%)

Table.5. Risk factors associated with dry eye disease patients.

Risk factors	No. of dry eye patients	Percentage
Systemic Disease	76	20.43%
Systemic Medication	61	16.39%
Topical Medication	50	13.44%
Smoking	164	44.08%
Air conditioning	13	3.49%
Contact Lens	08	2.15%
Total	372	100%

In the present study, most common risk factors of dry eye was smoking 164(44.08%). Others risk factors of dry eye were systemic disease 76(20.43%), systemic medication 61(16.39%), topical medication 50(13.44%), air conditioning 13(3.49%) and contact lens 08(2.15%).

Discussions

Dry eye disease (DED) is a multifactorial pathology that can cause ocular discomfort, affect vision and tear film stability, and damage the ocular surface [10,11]. The vast disparity in dry eye prevalence stems mainly from the different dry eye diagnostic criteria employed and different cut-off values for objective dry eye tests. The high prevalence in some studies is also because objective dry eye tests have been performed in patients with positive symptom score (thereby introducing a selection bias) or in patients with rheumatoid arthritis and Sjogren's syndrome, which have proven dry eye components. Previous studies suggest that dry eye prevalence ranges from 10.8% to 57.1% [12,13].

In our study, prevalence of dry eye was 43.55%. dry eye prevalence increased progressively with age, which is consistent with findings in other dry eye studies [14,15]. Higher prevalence of dry eye (56.27% and 53.66%) was seen in older age group patients (>50 years). This peak reflects a dry eye state induced by environmental exposure, to which in this age group. This phenomenon may be more common in tropical countries where sunlight and wind exposure is immense.

This trend can be explained by the fact that with increasing age there is an increase in lacrimal gland ductal pathology that could promote lacrimal gland dysfunction by its obstructive effect, also there is decrease in androgen levels [16]. In our study we found that there was a greater prevalence of dry eye among females (47.23%) than males (43.55%) [17]. This difference is statistically significant. This could be explained by the fact that hormonal influences in the pathogenesis of dry eye [18] have a greater bearing on females than males. Sex hormone levels may influence both the lacrimal and meibomian glands. The increased prevalence in females may also have been due to higher number of females with dry eye symptoms seeking advise for ocular problems.

In the present study, the predominant type of dry eye was evaporative dry eye (44.62%) followed by the mixed pattern (32.25%) and aqueous deficiency (23.11%). Effect of meibomian gland dysfunction in all age groups could be the reason for evaporating exceeding the aqueous deficient type [19].

Farmers/labourers (44.89%) had maximum prevalence.23,24 The probable explanation for this trend could be the increased exposure to precipitating or causative environmental conditions [20] (Sunlight/high temperatures/windy conditions/dirt/dust/smoke) among those involved in field jobs. Considerable prevalence among the young involved in office work (9.41%), could be due to increased screen viewing time which reduces blinking rate [21, 22] exposure to air conditioners for long hours, exposure to air pollution.

Dry eye prevalence was greater in smoker (44.08%). Smoking, air pollution and drugs have been suggested as risk factors in various studies [12,23]. Smoking predisposes the eye to tear film instability by its direct irritant action on the eyes and represents a modifiable risk factor in dry eye causation. A drug too may disrupt one or more components of the tear film causing it to become unstable.

In this study 20.43% of the patient had history of some systemic disease. Diabetes and hypertension were the most frequently encountered diseases. Second most frequently encountered was arthritis [24,25]. Consistent with the association with the systemic diseases 20.43% of the patient reported taking systemic medication 16.39% for long duration. Amongst the associated drugs antihypoglycaemic, amlodipine topped the list. Others included thyroxin, non-steroidal anti-inflammatory, H1 inhibitors. 13.44% had a history of topical medication (Anti-glaucoma, anti-histaminics, steroid antibiotic combination) although none of these drugs showed statistical significance in this study as a risk factor [25].

Dryness is the most frequently reported symptom in contact lens wearers. An early survey of contact lens associated dryness by Brennan and Efron [26] found that 75% of contact lens wearers reported dryness. A self-administered questionnaire administered in the UK by Young et al. [27] reported that 44% of 932 contact lens wearers experienced dry eye symptoms. In the present study, dry eye was seen in 2.15% contact lens wearer. Moss et al. [28] found that 15.3% of contact lens wearers reported dry eye symptoms, whereas only 12.8% of non-wearers had dry eye symptoms. In this study, the use of contact lenses was also associated with the risk of dry eye symptoms. The main limitation of the study is that it is a hospital-based study. Sample size and duration of study was small thus the study may not be representative for the entire population.

Conclusions

The present study concluded that the dry eye disease is preponderance in old age female population. Evaporative is the most common type of DED. Farmers/labourer is commonly suffered. Smoking and systemic disease are the most common risk factors of dry eye disease. Hence, Dry eye disease is a distressing problem which is often overlooked and is frequently underdiagnosed. The multifactorial etiopathogenesis and lack of specificity of symptoms explain why the clinical diagnosis of dry eye remains a challenge. It is crucial to increase awareness about this condition and continue research on DES among the population to obtain a more detailed analysis. Identifying the prevalence, symptoms and risk factors could enable the implementation of appropriate preventive measures against DED.

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