

Dry Eye: Association between Environmental Factors, Use of Visual Displays and Drugs in a Tertiary Eye Care Hospital**Baharul Hoque¹, Mir Alam Siddique², Subhra Das³, Nazrul Islam Ahmed⁴**¹Post Graduate Trainee, Regional Institute of Ophthalmology, Gauhati Medical College & Hospital, Guwahati, Assam, India²Associate professor, Regional Institute of Ophthalmology, Gauhati Medical College & Hospital, Guwahati, Assam, India³Professor, HOD, Regional Institute of Ophthalmology, Gauhati Medical College & Hospital, Guwahati, Assam, India⁴Registrar, Regional Institute of Ophthalmology, Gauhati Medical College & Hospital, Guwahati, Assam, India

Received: 25-05-2024 / Revised: 23-06-2024 / Accepted: 26-07-2024

Corresponding Author: Dr. Baharul Hoque

Conflict of interest: Nil

Abstract:

Dry eye is a multifactorial disorder, affecting the precocular tear film. Dry eye is an ocular surface disorder which damages the interpalpebral area of the eye due to either deficiency or excessive evaporation of tears. There is wide flexibility of the incidence of dry eye due to lack of standardized diagnostic procedures and patient selection. There is great association between environmental risk factors, use of visual display and drugs with dry eyes. The interesting thing is that all these risk factors are modifiable. So by modification of these risk factors dry eye disease prevalence can be reduced which gives patients better quality of life as well as reduced economic burden.

Keywords: Dry Eye Disease, Associated Risk Factors.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Abnormalities in the precocular tear film cause dry eyes. Classically, the precocular tear film is a three-layered structure of lipid, aqueous, and mucous layers arranged from posterior to anterior. As per the National Eye Institute/ Industry Workshop on Clinical Trials in Dry Eyes [1]: dry eye is characterized as an ocular surface disorder that damages the interpalpebral area of the eye due to either insufficiency or excessive tear evaporation. It also causes feelings of pain in the eyes.

The most common condition seen in ophthalmology practices is dry eye. [2] There is a significant variation in the prevalence of dry eyes, ranging from 10.8% to 57.1%. [3-7] the lack of standardization in dry eye surveys, objective testing, diagnostic criteria, and patient selection for the study accounts for a large portion of the discrepancy. The literature refers to several risk factors for dry eyes, such as sunlight exposure, high temperatures, low humidity, cigarette smoking, air pollution, use of visual displays, and drugs.

Aims We aim to determine the association between environmental factors, visual displays, drugs, with dry eye.

Objectives: To find out the preventive measures and modification of risk factors.

Materials and Methods

It is a cross-sectional observational study, 384 patients above 20 years of age with dry eye disease presenting to a tertiary eye care hospital were randomly enrolled in this study. Informed consent was taken from the patients. Patients suffering from acute ocular infection, extensive corneal or conjunctival pathology, and contact lens users, who had undergone extraocular or intraocular surgery within 1 year, were excluded. A p-value < 0.05 was considered statistically significant. 95 % confidence intervals were tabulated. Multiple logistic regression analysis tests were used to evaluate the independent relationship between environmental risk factors and dry eye. An odd ratio was used to study the strength of the association of environmental risk factors, use of visual displays for more than 3 hours, and drugs with dry eyes.

Results

Table 1 shows the strength of the association of various exposure factors, drugs, and use of visual displays > 3 hours with dry eye. All the exposure factors had a propensity for a higher risk of dry eye; excessive wind (OR:3.37), Sunlight/ High temperature(OR:1.8), Air pollution (OR:1.79), Smoking (OR:1.96), Drugs(OR:2.88), Use of visual displays > 3 hours(OR:2.34). A P-value >0.05 is

considered as statistically significant. Patients exposed to excessive wind (p= 0.0045), Sunlight/ High Temperature (p=0.0123), Air pollution(p=0.0217), Smoking (p=0.03), Drugs (p 0.008), Visual displays(p=0.0002) were at higher risk of developing dry eye disease. Commonly used drugs were chlorpheniramine eye drops, antibiotic-corticosteroid eye drops, antiglaucoma drugs, analgesics, bronchodilators, antihypertensives, antihistamines, and tranquilizers.

Table 1: Strength of association of Environmental factors, drugs, and use of visual display > 3 hours/day

Exposure factors	Non Exposed Group		Exposed Group		Odd Ratio	P value
	Total Subject	Dry Eyes	Total Subject	Dry Eyes		
Excessive wind	363	110	21	13	3.37	0.0045
Sunlight/High Temp	273	77	111	46	1.8	0.0123
Air Pollution	299	87	85	36	1.79	0.0217
Smoking	336	101	48	22	1.96	0.030
Drugs+	357	108	27	15	2.88	0.0088
Visual Display #	265	69	119	54	2.34	0.0002

† Chlorpheniramine eye drops, antibiotic-steroid eye drops, antiglaucoma drugs, analgesics, bronchodilators, antihypertensives, antihistamines, and tranquilizers. # Average use of visual display more than 3 hours per day

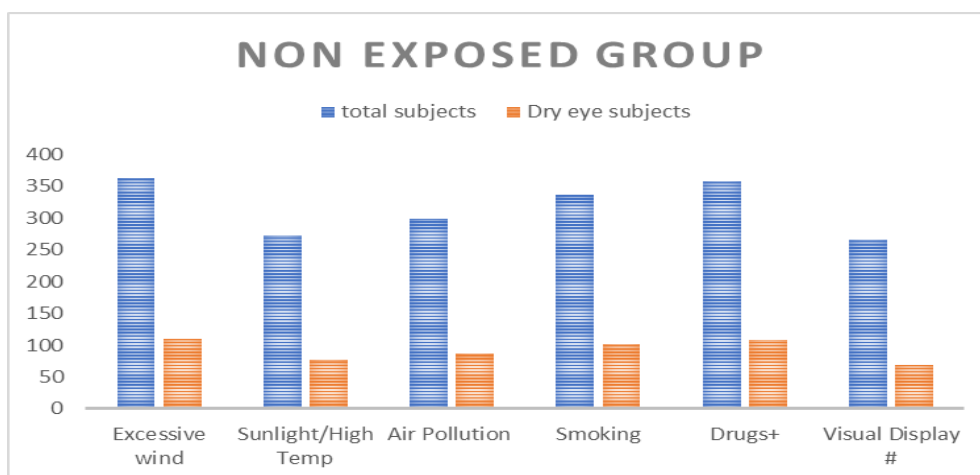


Figure 1: Strength of association between various environmental risk factors and dry eye in exposed group

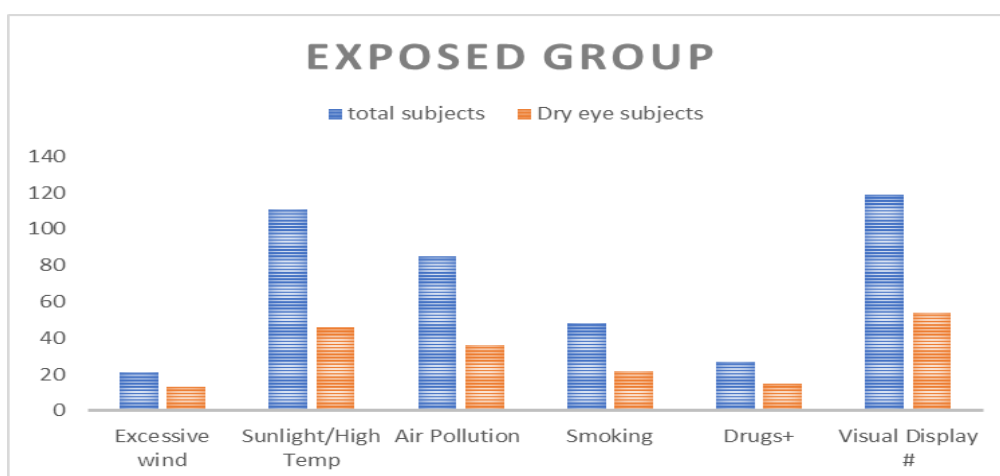


Figure 2: strength of association between various environmental risk factors and dry eye in exposed group

Discussion

According to earlier research, the incidence of dry eye can range from 10.8% to 57.1%. 3-7. Differing diagnostic standards and objective test cut-off values account for the inflexibility of the incidence of dry eye. Interpersonal variation of objective test values. In this study, it has been seen that exposure to excessive wind, Sunlight, high Temperature, Air pollution, and Smoking, using a visual display minimum of 3 hours per day is significantly related to dry eye causation. The odd ratio was used to evaluate the association between these exposure factors and dry eye disease. Smoking, Air pollution, and drugs have been suggested as risk factors in previous research. [3,8-12]

Smoking predisposes the eye to tear film instability by its direct irritant action on the ocular surface and represents a modifiable risk factor in dry eye disease. A drug may also disrupt one or more components of the tear film leading to become unstable and causing dry eye disease. Using visual displays like smartphones, computers, laptops, televisions, and tablets a minimum of 3 hours per day also causes dry eye disease by reducing the blink rate. Decreased blink rate causes exposure of tears to air leading to evaporation of tears and patients suffering from dry eye disease.

Visual display is also a modifiable risk factor. Environmental risk factors like Air pollution can be controlled by excessive plantation. Excessive wind causes dry eye disease by tear air contact. It can be prevented by wearing tight goggles. High temperatures causing dry eyes can be prevented by humidifying with air conditioning.

Conclusion

Dry eye disease has become a public health problem in India as well as globally. It causes an economic burden and impact on Quality of life. Changes in the lifestyle of people who suffer from dry eye disease can also improve the disease and quality of life.

References

1. Lemp MA. Report of the National Eye Institute/Industry Workshop on clinical trials in dry eyes. *CLAO J* 1995;21:221-32
2. Murube J, Wilson S, Ramos-Esteban J. New horizons in the relief and control of dry eye. *Highlights of Ophthalmology* 2001; 29:55- 64.
3. Hikichi T, Yoshida A, Fukui Y, Hamano T, Ri M, Araki K, et al. Prevalence of dry eye in Japanese eye centers. *Graefes Arch Clin Exp Ophthalmol* 1995; 233:555-8.
4. Farrell J, Grierson DJ, Patel S, Sturrock RD. A classification for dry eyes following comparison of tear thinning time with Schirmer tear test. *Acta Ophthalmol (Copenh)* 1992; 70:357-60.
5. Toda I, Fujishima H, Tsubota K. Ocular fatigue is the major symptom of dry eye. *Acta Ophthalmol (Copenh)* 1993; 71:347-52.
6. Albiets JM. Prevalence of dry eye subtypes in clinical optometry practice. *Optometry Vis Sci* 2000; 77:357-63.
7. Versura P, Cellini M, Torreggiani A, Profazio V, Bernabini B, Caramazza R. Dryness symptoms, diagnostic protocol and therapeutic management: A report on 1,200 patients. *Ophthalmol Res* 2001; 33:221-7.
8. Moss SE, Klein R, Klein BE. Prevalence of and risk factors for dry eye syndrome. *Arch Ophthalmol* 2000; 118:1264-8.
9. Lee AJ, Lee J, Saw SM, Gazzard G, Koh D, Widjaja D, et al. Prevalence and risk factors associated with dry eye symptoms: A population-based study in Indonesia. *Br J Ophthalmol* 2002; 86:1347-51.
10. Chopra SK, Saramma G, Daniel R. Tear film break-up time in non-contact lens wearers and contact lens wearers in normal Indian population. *Indian J Ophthalmol* 1985; 33:213-16.
11. Crandall DC, Leopold IH. The influence of systemic drugs on tear constituents. *Ophthalmology* 1979; 86:115-25.
12. Gupta SK, Gupta V, Joshi S, Tandon R. Subclinically dry eyes in urban Delhi: An impact of air pollution? *Ophthalmologica* 2002; 216:368-71.