Section: Ophthalmology

Original Research Article

QUALITATIVE ASSESSMENT OF DRY EYE DISEASE AMONG MEDICAL STUDENTS USING OSDI IN A PRIVATE MEDICAL COLLEGE IN NORTH COASTAL ANDHRA PRADESH

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ABSTRACT

Background: Dry Eye Disease (DED) is a relatively common condition affecting the ocular surface. It is a multifactorial disease, marked by symptoms such as eye discomfort, blurred vision, and instability of the tear film, which affects the ocular surface. While it is usually associated with older adults, there is a growing prevalence among younger individuals, particularly medical students due to prolonged screen exposure, environmental factors, and increased stress levels.

Aim: To determine the prevalence and severity of dry eye among medical students and to study the risk factors associated with dry eye.

Methods: A total of 365 students participated in this cross-sectional study conducted through an anonymous online questionnaire designed using Google Forms. The survey included demographic questions, information on systemic health, lifestyle habits (including digital screen use and environmental exposure), and the standardized Ocular Surface Disease Index (OSDI) questionnaire.

Results: According to the OSDI grading, prevalence of dry eye was seen in 54.53% (199/365) of students, of whom mild dry eye was seen in 31.78% (116/365), moderate dry eye in 13.9% (51/365), and severe dry eye in 8.76% (32/365) students. The prevalence of dry eye was 52.69% among females (137 out of 260) and 59.04% among males (62 out of 105). Regarding screen time in general, 93 students had a screen time of more than 6 hours per day, and 60 of them (64.5%) had dry eye. Among the 158 students with 4–6 hours of screen time daily, 90 (56.9%) had dry eye was a statistically significant association between screen time and dry eye ($p = 0.001$).

Conclusion: Our study emphasises the high burden of dry eye disease among medical students, with significant associations with screen time and refractive error. While not all risk factors reached statistical significance, the results emphasize the need for awareness campaigns, ergonomic education, and early intervention strategies in academic institutions to preserve ocular health in young adults.

Keywords: Dry Eye Disease (DED), Medical Students, Screen Time, Ocular Surface Disease Index (OSDI), Prevalence

INTRODUCTION

Ocular irritation caused by tear film instability is one of the most common problems encountered by eye care practitioners. Despite its prevalence, historically there has been considerable confusion regarding the definition and classification of dry eye conditions [(1)]. The NEI (National Eye Institute)5 definition of dry eye is: "Dry eye is a disorder of the tear film due to tear deficiency or excessive tear evaporation, which

causes damage to the interpalpebral ocular surface and is associated with symptoms of discomfort."[2] It can be seen in both the genders but has been seen to be more common in women.[3]

Several population-based epidemiological studies have utilized questionnaires to assess prevalence of dry eye symptoms. American and Australian studies have revealed a prevalence of 5%–16%, whereas Asian studies have revealed a higher prevalence of approximately 27%–33%. [4]

Most forms of dry eye disease (DED) share key symptoms: tear instability, hyperosmolarity, and interpalpebral surface damage. Common complaints include burning, itching, dryness, foreign body sensation, photophobia, redness, and ocular fatigue. Symptoms often worsen throughout the day, especially in low humidity, with screen use, or climate control, while some conditions (e.g., floppy eyelid syndrome) cause worse discomfort in the morning.

Meibomian gland dysfunction (MGD) causes unstable tear film, blurred vision, and a gritty sensation. In diabetics or those with corneal neuropathy, symptoms may be minimal despite significant risk of corneal damage.

Signs include conjunctival redness, reduced tear meniscus, increased debris, photophobia, and loss of corneal sheen. Reflex tearing (paradoxical epiphora), infection risk, filamentary keratitis, and rarely keratinization or vitamin A deficiency may occur.

There is a notable lack of comprehensive studies investigating the prevalence of dry eye disease (DED) among medical students in India. This population is particularly vulnerable due to prolonged exposure to digital screens, extended hours of reading and studying, and the associated environmental and behavioural risk factors. Medical students often engage in intensive academic activities that contribute to ocular surface stress, tear film instability, and symptoms consistent with DED. Given these occupational and lifestyle-related predispositions, this study aims to systematically evaluate the prevalence of dry eye disease among medical students, thereby contributing valuable data to an underexplored area and highlighting the need for preventive and management strategies within this high-risk group.

MATERIALS AND METHODS

A total of 365 students participated in this cross-sectional study conducted through an anonymous online questionnaire designed using Google Forms. The median age of the participants was 21 years, ranging from 17 to 39 years. The sample consisted of 260 female and 105 male students. The survey included demographic questions such as age, sex, and academic year, followed by information on systemic health, lifestyle habits (including digital screen use and environmental exposure), and the standardized Ocular Surface Disease Index (OSDI) questionnaire. Participants provided informed consent by selecting the appropriate checkbox prior to beginning the survey. The study was conducted in March 2024 in accordance with the ethical standards of the Declaration of Helsinki. OSDI scores were calculated using the standard formula, yielding a range between 0 and 100, where higher scores indicate more severe dry eye symptoms. A cutoff score of 13 was used to categorize students into symptomatic and asymptomatic groups. Descriptive statistics and comparative analyses were performed to explore associations between OSDI scores and potential contributing factors such as duration of digital device use, academic workload, and environmental exposure.

Statistical Analysis: Data were analysed using SPSS software version 29.0. Descriptive statistics including frequency, mean, and standard deviation were calculated for demographic variables, digital screen use, and OSDI scores. For group comparisons, categorical variables were analysed using the Chi-square test and ANNOVA test. The OSDI score was calculated for each participant using the standard formula, and participants were classified into two groups based on the established cutoff score of ≥13 for symptomatic dry eye disease (DED). A binary logistic regression analysis was conducted to assess the association between potential risk factors—such as age, gender, duration of digital device usage, and environmental exposure—and the presence of DED. Odds ratios (OR) with 95% confidence intervals (CI) were calculated to evaluate the strength of associations. A p-value of less than 0.05 was considered statistically significant for all tests.

RESULTS

The Ocular Surface Disease Index (OSDI) questionnaire was given to 365 medical students enrolled in Maharajah's institute of medical college in Vizianagaram, Andhra Pradesh in South India.

A total of 365 students participated in this study, with an average age of 21 years, ranging from 17 to 42 years. The majority of the population were women. Mean age is 21.22+-2.060.

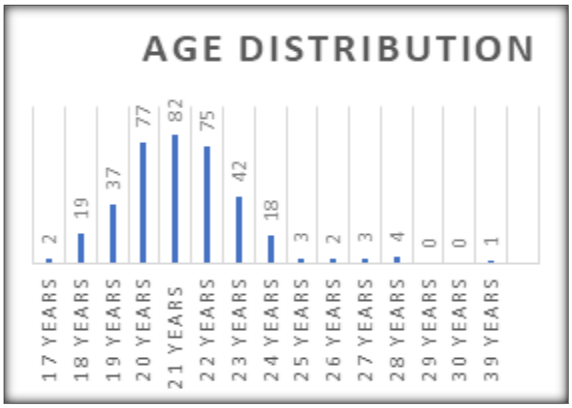

Figure 1: Showing the age distribution in the medical student population

Prevalence - According to the OSDI grading, dry eye was seen in **54.53% (199/365) of students**, of whom mild dry eye was seen in 31.78% (116/365), moderate dry eye in 13.9% (51/365), and severe dry eye in 8.76% (32/365) students.

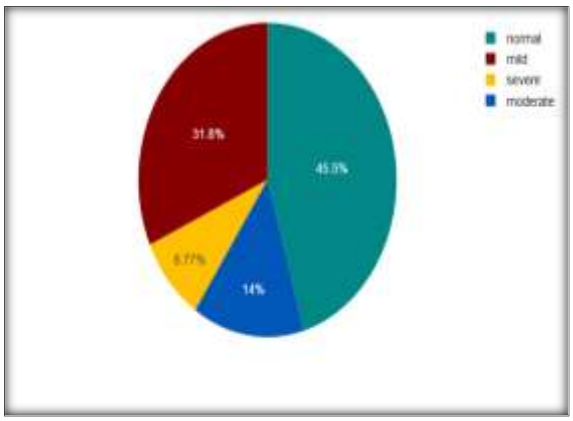

Figure 2: Prevalence of dry eye in medical students as per OSDI grading

Among the 365 students surveyed, 260 were female and 105 were male. The prevalence of dry eye was 52.69% among females (137 out of 260) and 59.04% among males (62 out of 105), with no statistically significant difference between the two groups (p = 0.27).

Table 1: Prevalence of dry eye in medical students as per OSDI grading

Grading of the dry eye	No of students	Percentage
Normal	166	45.47%
Mild	116	31.78%
moderate	51	13.9%
severe	32	8.76%

Table 2: Showing the sex distribution in the medical student population and the prevalence of dry eye among them

FEMALE STUDENTS (260)				MALE STUDENTS (105)			
NORMAL	DRY EYE			NORMAL	DRY EYE		
123 (47.4%)	137 (52.69%)			43 (40.96%)	62 (59.04%)		
	MILD	MODERATE	SEVERE		MILD	MODERATE	SEVERE
	78 (30%)	37 (14.23%)	22 (8.46%)		38 (36.19%)	14 (13.33%)	10 (9.5%)

Out of the total participants, 243 students (66.57%) wore spectacles. Among them, 154 students (63.37%) had dry eye, while 89 students (36.6%) did not. The severity of dry eye among spectacle users was categorized as follows: 82 students (33.7%) had mild dry eye, 42 (17.28%) had moderate, and 30 (12.3%) had severe dry eye. A significant association was found between spectacle use and dry eye (p < 0.001). This strong correlation may be due to increased screen time among spectacle users—68% of them reported using screens for 4–6 hours daily (105 students), and 60 students reported using screens for more than 6 hours a day.

Table 3: Showing the number of students using spectacle and their association with dry eye

Spectacle usage	No of students					Total no of students
	normal	Dry eye				
		mild	moderate	severe	Total no of students with dry eye	
Yes	89 (36.6%)	82 (33.7%)	42 (17.28%)	30 (12.3%)	154 (63.37%)	243
No	77 (63.11%)	9	34	2	45 (36.88%)	122
						365

Regarding screen time in general, 93 students had a screen time of more than 6 hours per day, and 60 of them (64.5%) had dry eye. Among the 158 students with 4–6 hours of screen time daily, 90 (56.9%) had dry eye. There was a statistically significant association between screen time and dry eye (p = 0.001).

Table 4: Showing the screen time and association of dry eye among the medical students

Time of exposure to video electronic devices	No of students					Total no of students
	normal	Dry eye				
		Mild	moderate	Severe	Total no of students with dry eye	
< 4 hrs/day	66 (57.8%)	28 (24.5%)	8 (7.01%)	12 (10.5%)	48 (42.1%)	114
4-6 hrs/day	68 (43.03%)	53 (33.5%)	24 (15.1%)	13 (8.2%)	90 (56.9%)	158
>6 hrs/day	33 (35.4%)	34 (36.5%)	19 (20.4%)	7 (7.5%)	60 (64.5%)	93

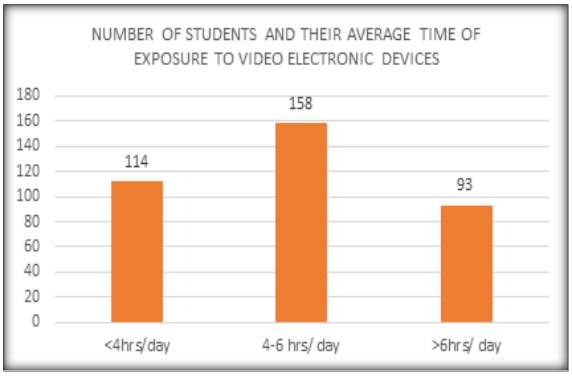

Figure 3: Showing the average time of exposure to video electronic devices

However, no significant association was observed between dry eye and sleep duration (p = 0.6) or smoking status (p = 0.1). The lack of association with smoking might be due to underreporting, possibly because of social stigma related to smoking among students.

Additionally, no significant relationship was found between age and the presence of dry eye (p = 0.9), likely because most of the participants were from a similar age group.

DISCUSSION

Dry Eye Disease (DED) is a multifactorial ocular surface disorder characterized by discomfort, visual disturbance, and tear film instability, with potential damage to the ocular surface. Despite being more commonly studied in older adults, younger populations such as medical students are increasingly affected due to their high screen time, environmental exposure, and stress levels.

The symptoms—ranging from dryness, burning, and foreign body sensation to photophobia and blurred vision—can be particularly burdensome and significantly impacts visual function, daily productivity, and quality of life.

In the present study conducted among 365 medical students at Maharajah's Institute of Medical Sciences in Andhra Pradesh, the overall prevalence of DED based on the Ocular Surface Disease Index (OSDI) was found to be 54.53%. This is notably higher than the global prevalence of approximately 11.59%,[5] and aligns more closely with findings from other high-risk populations in Asia.

A study among medical students at Gandaki Medical College, Nepal, also reported a 46% prevalence of dry eye using the OSDI questionnaire.[6] Another Indian study by Logaraj et al. found the prevalence to be 78.6% among medical students, further confirming the elevated risk in this academic subgroup.[7]

A gender-based analysis in our study showed a higher prevalence in males (59.04%) than females (52.69%), although this was not statistically significant (p = 0.27). This contrasts with several prior studies where DED prevalence was significantly higher in females. For example, Anshu Sahai et al. found dry eye to be more prevalent in females (22.8%) than in males (14.9%).[8] Similarly, In an Indian tertiary hospital-based population, the prevalence of dry eye based on OSDI scores was 27% in women versus 12% in men.[12] Hormonal influences, particularly androgens and oestrogen, may partly explain this trend, though behavioural and environmental exposures likely also contribute.

In our study, spectacle users showed a significantly higher prevalence of DED (63.37%, p < 0.001) compared to non-users (36.88%). This could be attributed to increased screen time among spectacle users—over two-thirds of them reported daily screen time exceeding 4 hours. While some literature supports a link between refractive error and DED, our findings contrast with Anshu Sahai et al., who reported a significant correlation between ametropia and dry eye symptoms.[8]

Screen exposure showed a strong and statistically significant association with DED (p = 0.001), aligning with several other reports. Students with screen time >6 hours/day had the highest dry eye prevalence at 64.5%, while those with 4–6 hours had 56.9%. This finding agrees with Cardona et al. and Tsubota et al., who observed reduced blink rates and incomplete blinking during computer use, leading to tear film instability and evaporative DED.[9,10,11]

Interestingly, our study did not find a significant association between DED and other risk factors like sleep duration (p = 0.6), smoking (p = 0.1), or age (p = 0.9). While limited sample variability may explain the lack of association with age, the smoking results might reflect underreporting due to stigma among student respondents.

Our study highlights the urgent need for early intervention strategies among medical students, such as:

- Encouraging the 20-20-20 rule to reduce visual fatigue.
- Raising awareness of blink training and screen ergonomics.
- Regular screening with tools like the OSDI to identify and manage early DED.

Strengths and Limitations –

This study contributes valuable epidemiological data on DED in Indian medical students—an underrepresented yet vulnerable group. The use of a standardized, validated OSDI questionnaire enabled efficient symptom screening.

One limitation of our study is the exclusive reliance on a subjective questionnaire (OSDI) without objective diagnostic tests such as Schirmer's or tear breakup time (TBUT).

Moreover, factors such as AC exposure, systemic medications, and environmental humidity were not deeply explored and could be addressed in future studies.

However, given the practicality and validated nature of the OSDI, especially in large-scale student-based surveys, it remains a robust tool for DED screening**.**

CONCLUSION

Our study reinforces the high burden of dry eye disease among medical students, with significant associations with screen time and refractive error. While not all risk factors reached statistical significance, the results emphasize the need for awareness campaigns, ergonomic education, and early intervention strategies in academic institutions to preserve ocular health in young adults.

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