Assessment of Symptomatic Dry Eye Disease among Postgraduate Medical Students of KIST Medical College and Teaching Hospital using an Ocular Surface Disease Index Questionnaire

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ABSTRACT

Background

Symptomatic dry eye disease is a growing public health challenge especially among those who are visual display unit users and other long-time near activity workers. Increased screen time, prolonged use of face mask and shortage of sleep among resident doctors increases the risk of developing dry eye disease that can affect their learning and social abilities. Data is insufficient on the prevalence of dry eye disease among postgraduate medical students in Nepal.

Objective

To find out the prevalence of symptomatic dry eye disease using an ocular surface disease index questionnaire among postgraduate medical students of KIST Medical College and Teaching Hospital.

Method

A cross-sectional study was conducted among three batches postgraduate medical students until 2023 of KIST Medical College and Teaching Hospital, Imadol, Lalitpur. A single validated symptom-based questionnaire with 12 questions was used to assess symptomatic dry eye disease.

Result

Total of 110 post-graduate medical students with mean age of 30.4 years, 67 males and 43 females were enrolled. Among them, 68 (61.8%) had dry eye disease. Severe dry eye was the commonest followed by mild dry eye. There was statistically significant association between dry eye disease with the increased screen time and suboptimal durations of sleep.

Conclusion

About half of postgraduate students faced symptomatic dry eye disease. It is advisable for residents to have optimum sleep as possible, limit screen time and establish regular break time along their exposure.

KEY WORDS

Ocular surface disease index questionnaire, Postgraduate medical students, Symptomatic dry eye disease

INTRODUCTION

Dry eye is a multifactorial disease of the ocular surface characterized by a loss of homeostasis of the tear film, and accompanied by ocular symptoms, in which tear film instability and hyperosmolarity, ocular surface inflammation and damage, and neurosensory abnormalities play etiological roles.[1] Among all ocular complaints, dry eye remains one of the most prevalent in clinical practice, ranging from 5 to 50% with higher variations in signs than symptoms. It is manifested by frequent symptoms of dryness, ocular pain, burning, visual disturbances, eye fatigue, grittiness, photophobia, soreness, eye irritation and tearing.[2]

Currently symptomatic dry eye disease (SDED) is a growing public health challenge especially among computer users. Based on a number of population-based estimates worldwide the prevalence of SDED ranges from 12.3 to 62.4% in adult population.[3] Postgraduate medical students are considered intelligent young adult with high level of education who spend prolonged period of time in academic activities using an electric devices for learning and research activities which increases risk of developing dry eye disease.

The prevalence of SDED among postgraduate medical students seems to be at alarming rate but no studies have been done to assess the ocular morbidity among postgraduate medical students. The data collected from this study will help to increase awareness of digital eye strain and symptomatic dry eye disease. Early detection and timely ocular treatment for dry eye will help to reduce the potential sight threatening complications of severe dry eye disease that may interfere with academic pursuits.

METHODS

A cross-sectional study was conducted from 31st July 2023 to 30th August 2023 among three batches of postgraduate medical students until 2023 of KIST Medical College and Teaching Hospital, Imadol, Lalitpur after obtaining IRC approval (Registration no. 2080/081/01) and informed written consent prior to the study. Students who had peripheral postings or submitted incomplete data forms were excluded from the study. Purposive sampling was used. Sample size was calculated by using the following formula,

$n= Z^2 X p X q/e^2$

$n= (1.96)^2 X 0.46 X 0.54/ (0.1)^2$

n= 95

n= minimum required sample size

Z= 1.96 at 95% Confidence Interval (CI)

p= prevalence is taken as 46.1% 4 for maximum sample size calculation

q= 1-p

e= margin of error, 10%

The calculated sample size was 95. However, 110 samples were included in the study. A self-administered questionnaire was used to obtain demographic data, education status, use of spectacles or contact lens, screen time per day, average sleep hour per day in the last week, duration use of face mask and hours exposed to an air conditioner (AC).

Data collection was meticulously done by the faculty and intern doctors of the Ophthalmology department of KIST Medical College and Teaching Hospital. Data were collected in demography details, education status, use of spectacles or contact lens, screen time per day, average sleep hour per day, duration use of face mask and hours exposed to AC.

A single validated symptom-based questionnaire was used to asses SDED: a standard ocular surface disease index (OSDI) questionnaire with 12 questions which is a validated and repeatable tool. The 12 variables of the OSDI questionnaire were graded on the scale of 0-4, where 0 indicates none of the time; 1, some of the time; 2, half of the time; 3, most of the time; and 4, all of the time. The total OSDI score will be then calculated based on the following formula: OSDI=[(sum of scores for all questions answered) X100]/[(total number of questions answered)X4]. The OSDI score was calculated on a scare of 0-100, with the higher scores representing greater disability. According to the OSDI score, SDED were classified as mild dry eye (13-22 points), moderate dry eye (23-32 points) or severe dry eye (33-100 points).[4]

Results were grouped and analyzed by SPSS (ver. 16). Descriptive statistical methods (frequency, percentage) and mean ± standard deviation, were used to statistically analyze the data. The data was statistically analyzed using the Chi-square test. A p-value of < 0.05 was considered statistically significant.

RESULTS

A total of 110 post-graduate medical students, 67 males and 43 females were enrolled. The students were in their early thirties with mean age 30.4 ± 2.8 years, with male predominance (1.5:1) and mostly from Brahmin ethnic background (31.8%) (table 1).

The prevalence of symptomatic dry eye disease according to the OSDI questionnaire in this study was 61.8%. Most of the students had severe dry eye 25.5% followed by mild dry eye 22.7% (table 2).

Out of 110 students surveyed, more than half of the study population had some form dry eye disease. The OSDI grading of symptomatic dry eye disease correlated significantly with hours per day use of screen time and an average sleep duration less than 7 hours per day in the last week (p- value < 0.05) (table 3).

Table 1. Demographic information of the study population

Demographic information (N= 110)	Mean (SD)
Age (years)	30.4(2.8)
Ethnic Groups	Number (%)
Brahmin	35(31.8)
Chettri	30(27.2)
Newar	25(22.7)
Madhesi	12(10.9)
Mongolian	7(6.3)
Others	1(0.9)
Gender	
Male	67(61)
Female	43(39)

Table 2. Prevalence Pattern of Symptomatic Dry Eye Disease as per OSDI score grading

OSDI score	Grading of Dry Eye Disease	Number (%)
0-12	Normal	42 (38.2)
13-22	Mild Dry Eye	25 (22.7)
23-32	Moderate Dry Eye	15 (13.6)
33-100	Severe Dry Eye	28 (25.5)

Table 3. Association of OSDI grading of dry eye disease with screen time and average sleeping hours per day in the last week.

Duration in Hours/day	OSDI Grading of Dry Eye Disease N (%)				Chi square value	p-value
Screen time	Normal	Mild Dry Eye	Mod-erate Dry Eye	Severe Dry Eye		
< .2	7 (70)	2 (20)	0 (0)	1 (10)	19.3	0.023
2-4	19 (48.7)	8 (20.5)	4 (10.3)	8 (20.5)		
4-6	6 (25)	10 (41.7)	4 (16.7)	4 (16.7)		
> 6	10 (27)	5 (13.5)	7 (18.9)	15 (40.5)		
Sleep time						
< 7	20 (31.2)	20 (31.2)	11 (17.2)	13 (20.3)	9.8	0.020
> 7	22 (47.8)	5 (10.9)	4 (8.7)	15 (32.6)		

There was no significant association between dry eye disease with the use of face mask and exposure to the air conditioner as shown in table 4.

Table 4. Association of OSDI grading of dry eye disease with the use of face mask and exposure to an air conditioner.

Duration in Hours/day	OSDI Grading of Dry Eye Disease N (%)				Chi square value	p-value
Use of face mask	Normal	Mild Dry Eye	Mod-erate Dry Eye	Severe Dry Eye		
< 6	21 (38.9)	15 (27.8)	4 (7.4)	14 (25.9)	4.2	0.23
> 6	21 (37.5)	10 (17.9)	11 (19.6)	14 (25)		
Exposure to AC						
No exposure	17 (48.6)	4 (11.4)	3 (8.6)	11 (31.4)	6.0	0.11
Exposure	25 (33.3)	21 (28)	12 (16)	17 (22.7)		

DISCUSSION

Medical students are a special group with special characteristics. Their lifestyle puts them under a great deal of stress, driving them to certain behaviors in order to cope, such as ingesting caffeinated drinks frequently and abusively using their electronic devices. SDED is one of the most prevalent ophthalmic disorders and may have an adverse impact on the quality of life. Our results showed that the prevalence of symptomatic dry eye disease among postgraduate medical students was 61.8% with a standard OSDI score. This finding is consistent with the study conducted among medical students in Serbia.[5] In contrast, other studies have revealed even higher prevalence of dry eye disease among medical students than our study.[6,7]

A study done by Tuladhar et al. in Pokhara concluded with prevalence of dry eye disease among medical students as 46.1%.[8] Likewise in a study by Shrestha et al. in Dhulikhel stated that approximately 18% medical students had some form of dry eye disease.[9] Similarly in a study conducted at the University of Tabuk found that 18.2% of medical students had dry eye disease and identified the associated risk factors. Early diagnosis and treatment are crucial to prevent complications due to high prevalence of SDED.[10]

This study showed that the symptomatic dry eye disease correlated significantly with hours per day use of screen time and an average sleep duration less than 7 hours per day in the last week (p=0.02). This findings are consistent with the studies conducted among medical students worldwide.[11-15] A study done in India concluded that that prolonged screen time predisposes to the development of dry eye disease.[16] Likewise another study from the Uttar Pradesh, India found that prolonged duration of digital screen exposure in any form (laptop and mobile phone, etc.) is directly related to the risk of dry eye disease in the long term. Majority of the students were willing to

reduce their screen time as a preventive measures towards dry eye.[17] In a study from China conducted among senior high school students, almost 23.7% had SDED and poor sleep quality was significantly associated with SDED.[18] Meanwhile another study from Indonesia found that poor sleepers significantly correspond to 2.96 times more risk of dry eye disease than an adequate sleeper.[19] These findings were similar to the results of a previous study that was conducted in Singapore.[20] A study from Japan found that sleep disturbance seem to influencing factors of dry eye disease as 45% of the participants in the dry eye disease group reported poor sleep quality.[21]

This study also found that wearing a facemask was not significantly associated with the symptomatic dry eye disease. This result was in accord with study done among medical students in Jordan.[22] In contrast to our study, Vickovic et al. concluded that a longer duration of time spent using a face mask is consistently liked to grater OSDI scores.[23] Numerous studies have revealed that the convection of air around the eyes brought on by an incorrectly fitted mask may have an impact on the ocular surface .Face mask greatly decrease the flow of air outward, and when the mask is worn loosely against the face, the air that is exhaled is likely to travel upward, which increases tear evaporation and aggravates the symptoms of ocular surface disease.[23] Our study points out that there was no significant association between dry eye disease with the exposure to the air conditioner. In contrast to this, study done by Soman et al. found significant impact on tear evaporative parameters in young healthy individuals with the air conditioning of the room.[24]

As a limitation, using a single validated questionnaire instead of combined tool (OSDI and other objective assessments) might have affected the estimation of dry eye disease. The present research was a single center-based study among postgraduate medical students hence, the conclusion derived from this study may not be representative data of overall medical students across the country. Recall biases from the participants, especially about the duration of screen time, sleep time, use of face mask and exposure to air conditioner as the study was based on the self-declared answers on the questionnaire. Additionally, we believed that a larger sample size would be required to make a robust analysis and arrive at a better estimate of dry eye disease and associate factors among the vulnerable groups of population.

CONCLUSION

About half of postgraduate medical students had symptomatic dry eye disease. Prolonged screen time and sleep duration less than seven hours per day within last week were the significantly associated risk factors. Accordingly, it is crucial to increase awareness about this condition and continue research on dry eye disease among the younger generation to obtain a more detail analysis. Identifying the prevalence, symptoms and risk factors could enable the implementation of appropriate preventive measures against dry eye disease among the young population.

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