PREVALENCE AND RISK FACTORS OF DRY EYE DISEASE SYMPTOMS AMONG MEDICAL UNDERGRADUATES IN SOUTH INDIA

Ophthalmology

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ABSTRACT

BACKGROUND: The study was conducted to determine the prevalence of symptomatic Dry Eye Disease (DED) its relationship with associated risk factors among medical undergraduates.
METHODS: This cross-sectional study was conducted between December 2017 to May 2018. After Institutional Ethics Committee approval, a validated questionnaire was administered to second and third year medical undergraduates. The severity of the disease was measured via the Ocular Surface Disease Index (OSDI) questionnaire.
RESULTS: The mean age of the participants (±SD) was 20.33±1.15 years. The overall prevalence of DED was 39.1%. The prevalence of mild, moderate and severe DED were 21.8% (104), 10% (48) and 7.3% (35) respectively. There was statistically significant association of DED with refractive error, headache, and use of eye drops.
CONCLUSION: Symptomatic DED is prevalent amongst medical undergraduates. It is important to diagnose the condition and risk factors early and thereby orient the future doctors towards betterment of their own overall ocular health.

KEYWORDS

Dry Eye Disease, OSDI, Symptomatic DED

INTRODUCTION

Dry Eye Disease (DED) is characterized by a vicious cycle of tear film instability, hyperosmolarity, chronic inflammation and neurosensory abnormalities. These subsequently lead to ocular surface damage. [1]

Previous studies have reported several risk factors that influence the development of DED. These are external conditions like low humidity, urban pollution; personal factors like age, systemic diseases; personal activities such excessive use of Video Display Units (VDU), smoking, use of contact lenses, refractive surgery, and use of ocular drops. The reported prevalence of DED ranges from 5 to 50%. [2, 3] Clinical signs and symptoms of DED very often lack coherence with subjective symptoms and complaints by the patients and vice versa. The ideal diagnosis of DED, thus, requires a validated symptom questionnaire be administered at the beginning of the patient interaction followed by a battery of clinical tests. [1, 4] The Ocular Surface Disease Index Questionnaire (OSDI) is one such questionnaire that is widely used in epidemiological studies. [5] Recent studies conducted using OSDI in medical and other university students from Asian countries stated that symptomatic DED is prevalent in that age group. [2, 6,7]

There are many published studies on the ocular health of school children in India. Our literature search in younger population on ocular morbidity in college going students in India yielded very few studies. A recent study from India focused on ocular health in medical and engineering students the context of increased usage of VDU and smart phones. [9] With this background, this study was taken up to determine the prevalence of symptoms of DED and its relationship with associated risk factors in medical students using the OSDI questionnaire.

METHODS

This cross-sectional study was conducted from December 2017 to May 2018. After the approval from the Institutional ethics committee, undergraduate medical students of Vydehi Institute of Medical Sciences & Research Centre were invited to take part in the study. Permission to use OSDI was obtained from Allergan Inc., Irvine, CA. A 10 item validated questionnaire was developed to estimate the risk factors of DED. The questionnaire along with OSDI was administered by the authors over 5 sessions. Enough time was given to document responses by the participants. After collecting initial responses, orientation on ocular hygiene was conducted. Participants with OSDI scores suggesting DED were advised to visit Ophthalmology department for further clinical evaluation and needful. The response scores were double checked by the investigators, tabulated, and analyzed using SPSS version 21.

RESULTS

Demographic profile: A total of 500 forms were distributed. 484 forms were returned (response rate: 96.8%). Out of these, 6 forms were incomplete and hence excluded from the study. Finally, a total of 478 responses were evaluated. Out of 478 participants, 68.4 % (327) were females, and 31.6% (151) were males. The mean age of the participants (±SD) was 20.33±1.15 years. The demographic details of participants are shown in Table 1.

Grouping based on OSDI score: Based on OSDI score, participants were grouped into normal, mild, moderate, and severe DED respectively. It was found out that 60.9% (291), 21.8% (104), 10% (48) and 7.3% (35) participants had normal, mild, moderate, and severe OSDI scores (p <0.001). The OSDI score based grouping of participants are shown in Table 1.

Prevalence of DED based on OSDI: DED was found to be present in 37.6% (123) females and 42.4% (64) males. The association between gender and DED was found to be not significant (p value was 0.178). The overall prevalence of DED was found to be 39.1%. The prevalence of mild, moderate and severe DED was found to be 21.8% (104), 10% (48) and 7.3% (35) respectively (p <0.001). The results are shown in Table 1.

Co-morbidities: Out of all the participants, 64.4% (308) had refractive error. Out of them 52.1% (249) were myopes and 10.5% (50) were hypermetropes. There was a significant difference between OSDI median score (Q1, Q3) in normal, myopes, and hypermetropes respectively (p <0.001). 47.1% (226), 6.3% (30), 47.1 (225), and 5.4% (26) participants suffered from headache, migraine, sinusitis and anemia respectively. It was also found out that 4% (19) participants

were on eye drops. The results are shown in Table 1.

Table 1: Demographic details, OSDI scores and comorbidities

Variables	Data	p-value
Age (Mean±SD)	20.33±1.15 years	-
Sex (Percentages/Number) Males Females	31.6% (151) 68.4 % (327)	0.300
OSDI based groups Normal Mild DED Moderate DED Severe DED	60.9% (291) 21.8% (104) 10% (48) 7.3% (35)	<0.001
OSDI median score (Q1, Q3) Normal Mild DED Moderate DED Severe DED	4.16(2.08,8.33) 15(12.77,18.70) 27(25,29.01) 39.2(35.36,50)	<0.001
Overall DED sex wise Males Females	42.4% (64) 37.6% (123)	0.178
Comorbid conditions 1. Refractive error i) Myopia • Mild (SE between -0.75 and -2.99D) • Moderate (SE between -0.3.00 and -5.99D) • Severe (SE equal or more than -6.00) ii) Hypermetropia iii) Others 2. Headache 3. Migraine 4. Sinusitis 5. Anemia	64.4% (308) 52.1% (249) 61.0% (152) 32.9% (82) 6.1% (15) 10.5% (50) 1.8% (9) 47.1% (225) 6.3% (30) 47.1 (225) 5.4% (26)	<0.001 <0.001 - - -
OSDI median score (Q1, Q3) Normal Myopes Hypermetropes	5.55(2.03,12.50) 10.40(4.16,20.45) 9.74(6.25,18.18)	<0.001
Use of ophthalmic drops	4% (19)	<0.001

Risk factors for symptomatic DED:
The following risk factors were evaluated. Results are shown in Table 2.

i) Refractive error: In participants with refractive error, the overall prevalence of DED was 47% (145). The association of refractive error and DED between the groups was found to be statistically significant (p<0.001).

ii) Headache: 47.1% (226) participants mentioned that they suffer from headache, and 6.3 % (30) participants were found to suffer from migraine headache. Among the participants that suffer from headache, the overall prevalence of DED was 48.4% (78). The prevalence of mild, moderate and severe DED was found to be 22.6% (51), 15.1 % (34), and 10.6% (24) respectively. There was statistically significant association of DED with headache (p<0.001).

iii) Currently on any drops: 4% (19) participants mentioned that they were on eye drops. Out of them 68.4% (13) were found to have DED. There was statistically significant association of DED with use of eye drops (p<0.001).

iv) Time spent in reading per day (hours): 18.4% (88), 27.4% (131), 41.4% (198), 11.9% (57), 0.8% (4) participants were found to spent ≤1 hr, ≤ 2hr, ≤ 3hr, ≤4hr, and ≥4hr respectively. The prevalence of DED (overall) was 37.5%, 44.3%, 33.3%, 49.1%, and 50% respectively.

v) Time spent on TV/Laptop/Smart phone in a day (hours): 9.8% (47), 26.6 (127), 23.4% (112), 16.3% (78), and 20.5% (98) were found to spent ≤1 hr, ≤ 2hr, ≤ 3hr, ≤4hr, and ≥4hr respectively. The prevalence of DED (overall) in the above groups was 31.9%(15), 33.1%(42), 43.8%(49), 50%(39), 39.9%(39) respectively.

Table 2: Association of risk factors and symptomatic DED

Questions	Responses	Group					p value
		Normal	Mild	Moderate	Severe	Total	
Do you have refractive error	No	128 (44)	23(22.1)	13(27.1)	6(17.1)	170(35.6)	<0.001
	Yes	163(56)	81(77.9)	35(72.9)	29(82.9)	308(64.4)	
	Total	291(100)	104(100)	48(100)	35(100)	478(100)	
Do you suffer from headache	No	175(60.1)	53(51)	14(29.2)	11(31.4)	253(52.9)	<0.001
	Yes	116(39.9)	51(49)	34(70.8)	24(68.6)	225(47.1)	
	Total	291(100)	104(100)	48(100)	35(100)	478(100)	
Are you currently on any drops	No	285(97.9)	100(96.2)	43(89.6)	31(88.6)	459(96)	0.004
	Yes	6(2.1)	4(3.8)	5(10.4)	4(11.4)	19(4)	
	Total	291(100)	104(100)	48(100)	35(100)	478(100)	
How many hours do you spend in reading in a day	Not Mentioned	14(4.8)	1(1)	1(2.1)	2(5.7)	18(3.8)	NA
	<=1	41(14.1)	17(16.3)	7(14.6)	5(14.3)	70(14.6)	
	<=2	73(25.1)	31(29.8)	17(35.4)	10(28.6)	131(27.4)	
	<=3	132(45.4)	41(39.4)	13(27.1)	12(34.3)	198(41.4)	
	<=4	29(10)	13(12.5)	9(18.8)	6(17.1)	57(11.9)	
	>4	2(0.7)	1(1)	1(2.1)	0(0)	4(0.8)	
	Total	291(100)	104(100)	48(100)	35(100)	478(100)	
How much time do you spend on TV/Laptop/Smart phone in a day(hours)	Not Mentioned	13(4.5)	2(1.9)	0(0)	1(2.9)	16(3.3)	NA
	<=1	32(11)	6(5.8)	5(10.4)	4(11.4)	47(9.8)	
	<=2	85(29.2)	29(27.9)	11(22.9)	2(5.7)	127(26.6)	
	<=3	63(21.6)	29(27.9)	13(27.1)	7(20)	112(23.4)	
	<=4	39(13.4)	19(18.3)	8(16.7)	12(34.3)	78(16.3)	
	>4	59(20.3)	19(18.3)	11(22.9)	9(25.7)	98(20.5)	
	Total	291(100)	104(100)	48(100)	35(100)	478(100)	

Total number of participants: 478; Groups were based on OSDI scores. Statistical analysis was conducted using Chi square test. P value of <0.001was considered statistically significant.

DISCUSSION

This is the first study on symptomatic DED conducted amongst medical undergraduates in India. The prevalence of DED in this study was found to be 39.1%. The prevalence was found to be more in males, but the association was not statistically significant. A study involving 700 university undergraduates in Ghana reported the prevalence of symptomatic DED to be 44.3%. Sex was not significantly associated with DED. [10] Another cross-sectional study that included 209 students at a medical school in Korea found the prevalence to be 27.1%. [11] A study conducted at a medical school in China estimated the prevalence to be 18.7%. The risk factors evaluated were daily reading time of ≥4 h, daily computer use of ≥4 h and constant use of eyeglasses. [12] A cross-section hospital-based, observational study in North India found out the symptomatic DED prevalence to be 32%. It opined that DED is

more common in the age group of 21–40 years. Male sex (65.3% males, 34.7% females) , VDT use of 4 hours or more, and contact lens use were associated with increased odds of developing DED. [13] As our study was on young adults (20.33±1.15 years), the prevalence (39.1%) and male sex preponderance for DED (42.4% males, 36.6% females) coincides with this study conducted in North India.

In this study, the most common refractive error documented was myopia. It was found to be prevalent in 52.1% participants. Previous studies conducted among the medical students of Saudi Arabia, Malaysia, Singapore and Norway also reported higher prevalence of myopia amongst medical students. Our results, thus coincide with the above studies. [14, 15, 16, 17] The Saudi study found out the prevalence of myopia to be 53.7%. Even though genetics has a role to play in myopia, recent studies blame it on lack of ocular hygiene like not taking a break after every hours of studying, studying under a dim lamp, screen time of more than 3 hours/day, rubbing eyes etc. towards increased prevalence of the same. [18] Our study found out that headache, and use of eye drops are risk factors for DED. The results coincide with previous studies. [13, 18,19]

This study has limitations as follows: 1) Data of only 478 participants from a single medical school were included. This is substantially small number to represent the overall population of medical undergraduates from south India. 2) Closed ended questionnaire was administered to evaluate the risk factors. However, we believe that this study could provide significant information regarding prevalence and risk factors 3) Diagnosis of DED was made based on OSDI, examination for dry eye signs was not performed as part of the study. However, various previous studies were successfully conducted using the questionnaire as the reliability for such is already established. In this study, we suggested to participants to undergo clinical examination. This will help establish the diagnosis, and confirm the severity of DED and plan suitable treatment.

CONCLUSION
The study provided useful insight about symptomatic DED amongst medical undergraduates from a select medical school of South India. A larger study involving more medical institutions from different geographical regions can be taken up. Based on questionnaire based identification of population at risk for DED, clinical examination can be suggested. This will help prevent ocular morbidities and enhance betterment of overall ocular health.

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