Ocular Survey in Kathmandu University Medical Students

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ABSTRACT

Background

Medical students spend long time in academic activities that increases the risk of developing refractive errors and dry eyes that can affect their learning and social abilities. Only a few studies are available regarding ocular problems and its contribution to visual impairment among medical students in Nepal.

Objective

To evaluate the ocular problems among the medical students in a University hospital.

Method

An observational, descriptive, cross-sectional study was conducted among five batches undergraduate medical students until 2022 of Kathmandu University School of Medical Sciences, Dhulikhel, Kavre. A self-administered questionnaire was used to obtain demographic data and information on visual problems followed by a detailed ocular examination that included refraction, color vision and Schirmer test.

Result

Total of 284 medical students (with 568 eyes) with mean age of 22.8 years, 179 males and 105 females were enrolled. Among them, 270 (47.5%) eyes were emmetropic. Simple Myopia was the commonest followed by Compound Myopic Astigmatism. The mean spherical equivalent in right and left eye were -0.914 ± 1.54 and -0.886 ± 1.53 respectively. Approximately 18% students had some form of dry eye. Nineteen students (6.7%) had color vision deficiency and 13 (4.6%) had deuteranomalia, 3(1.1%) had deuteranopia and 3(1.1%) had protanomalia.

Conclusion

Eye defects, like refractive errors, dry eyes and color blindness, are common among medical students. They need to be advised for frequent eye check up in order to diagnose eye defects timely and arrest visual impairment at early stage.

KEY WORDS

Color vision, Dry eye, Medicals students, Refractive errors

INTRODUCTION

Eyes are the principal organs of visual system and provide us with vision which is an important means of knowledge integration.[1,2] Good vision and learning are closely related and is essential for students of all ages and arenas to maximize their academic potential. Medical students are considered intelligent young adults with high level of education who spend prolonged period of time in academic activities thus increasing the risk of developing refractive errors like myopia owing to their intensive near work.[3] They also spend considerable amount of their time using electronic devices for learning and research activities which increases risk of developing dry eyes too. Color vision is also one of the important elements of visual perception. Thus, good visual function and color perception are equally important specially for medical students since it can have negative effects on their learning and social abilities. Reports have shown that prevalence of eye defects like myopia have been found significantly high among medical students and tends to be on increase.[4-9] In addition to refractive errors, significant number of medical students were found to have color vision deficiency too.[10-12]

The prevalence of eye defects among medical students seems to be at alarming rate but very few studies have been done to study the gravity of ocular problems as well as assess the factors contributing to visual impairment among medical students in Nepal. This study aimed to provide basic data regarding the ocular problems among the medical students which may aid in pre- assessment of visual function before enrollment in medical school enabling the detection and treatment of any ocular problems that may interfere with academic pursuits. The data collected from this study would help to increase the awareness of ocular defects and to enhance the vision associated promotional activities in order to reduce the burden of preventable blindness.

METHODS

An institution-based observational, descriptive, cross-sectional study was conducted among five batches of undergraduate medical students until 2022 of Kathmandu University School of Medical Sciences, Dhulikhel, Kavre after obtaining IRC approval and informed written consent was obtained from each medical student prior to the study. A self-administered questionnaire was used to obtain demographic data, family history and other information regarding visual problems followed by the detailed ocular examination.

Ocular examinations were carried out in a well equipped Ophthalmology outpatient department of Dhulikhel Hospital, Kathmandu University Hospital. The Log Mar chart was used to assess distant visual acuity. Each student underwent refraction using retinoscope (Heine Beta 200). Refractive errors were categorized as: myopia, hypermetropia and astigmatism. All the participants were further evaluated in the slit lamp machine (Haag streit BQ 900) for anterior segment and posterior segment pathologies by the Ophthalmologist. Color vision test using Ishihara pseudo-isochromatic chart consisting of polychromatic plates and Schirmer's test with topical anaesthesia (proparacaine hcl, 0.5% eye drops) were performed for each participant in both eyes. Wetting of the Schirmer strip, more than 15 mm, was graded as normal or no dry eye, 11 to 15 mm as mild dry eye, 5 to 10 mm as moderate dry eye and less than 5 mm as severe dry eye.

All the tests were carried out in both eyes separately for any significant variation. Results were grouped and analyzed by SPSS (ver 25.0). Descriptive statistical methods (frequency, percentage) and mean ± standard deviation, were used to statistically analyze the data. An appropriate parametric and non-parametric tests were used for comparison of variables. A p value of < 0.05 was considered statistically significant.

RESULTS

A total of 284 medical students (568 eyes), 179 males and 105 females were enrolled. The students were in their early twenties with mean age of 22.8 ± 1.7 years, with male predominance (1.7:1) and mostly from Brahmin and Chhetri ethnic background (63%) (table 1).

Table 1. Demographic Information of the study population

Demographic Information (N=284)	Mean (SD)
Age (years)	22.8 (1.7)
Height (Cm)	165.8 (7.4)
Weight (Kg)	59.9 (10.2)
Body Mass Index (BMI)	22.1 (8.3)
Ethnic Groups	**Number (%)**
Brahmin and Chhetri	179 (63)
Newars	44 (15.5)
Madhesi	49 (17.3)
Others (Rai, Tamang, Gurung, Sherpa)	7 (2.5)
Foreign Students	5 (1.8)
Gender	
Male	179 (63)
Female	105 (37)

Out of 284 students surveyed, 53.9% had some degree of ocular problems; out of which 51.8% of them had difficulty in far vision suggestive of refractive error. About 47% of the students were already using glasses for their vision related problems. Out of 568 eyes of 284 students, 270 (47.5%) eyes were emmetropic and rest were ametropic.

Almost half of the study population had some form of refractive errors, Simple Myopia being the commonest

form followed by Compound Myopic Astigmatism. Mixed astigmatism was observed in only three eyes (table 2).

Table 2. Pattern of Refractive Error

Right Eye N (%)	Pattern of Refractive Error	Left Eye N (%)	Total Eyes
133 (46.8%)	Emmetropia	137 (48.2%)	270 (47.5%)
70 (24.6%)	Simple Myopia	72 (25.4%)	142 (25%)
27 (9.5%)	Simple Myopic Astigmatism	23 (8.1%)	50 (8.8%)
53 (18.7%)	Compound Myopic Astigmatism	49 (17.3%)	102 (17.6%)
0	Compound Hyperopic Astigmatism	1 (0.4%)	1 (0.2%)
1 (0.4%)	Mixed Astigmatism	2 (0.7%)	3 (0.5%)
Right Eye (Mean ± SD)	**Visual Acuity**	**Left Eye (Mean ± SD)**	
0.16 ± 0.38	Presenting V/A in LogMAR	0.148 ± 0.37	P=0.01 (paired T-test for Presenting and Best corrected VA)
0.0002± 0.002	Best Corrected V/A in LogMAR	0.0013 ± 0.008	
-0.914 ± 1.54	Mean Spherical Error	-0.886 ± 1.53	

The mean spherical equivalent in the right eye and left eye was -0.914 ± 1.54 and -0.886 ± 1.53 respectively. The mean presenting visual acuity in the right and left eye was 0.16 ± 0.38 and 0.148 ± 0.37, respectively whereas the best corrected visual acuity in the right and left eye was 0.0002 ± 0.002 and 0.0013 ± 0.008, respectively.

The mean Schirmer's score for right eye and left eye at five minutes were statistically not significant. Approximately 18 percent of study population had some form of dry eye. Most of the students had mild dry eye followed by moderate dry eye. Schirmer's value correlated significantly with hours per day use of computer and mobile (table 3).

Table 3. Results of Schirmer test and Correlation to Hours/ day spent on gadgets

Schirmer Test (N = 284) (millimeters)	Mean (SD)	
Right Eye	22.3 (6.9)	
Left Eye	22 (6.7)	p=0.46 (t-test)
Severity of Dry Eye	Right Eye N(%)	Left Eye N(%)
Severe Dry Eye	6 (2.1)	7 (2.5)
Moderate Dry Eye	15 (5.3)	5 (1.8)
Mild Dry Eye	29 (10.2)	40 (14.1)
No Dry Eye	234 (82.4)	232 (81.6)
Hours of activities/ day	Mean (SD)	Pearson Correlation of Schirmer test and Hours of day spent in different activities. (p value)
Study	4.1 (2.1)	0.067 (0.257)
TV and Computers	2.4 (1.7)	-0.206 (0.000)
Mobile use	2.4 (1.5)	-0.19 (0.001)
Sleep	7.2 (1.1)	-0.091 (0.124)

The overall percentage of color vision deficiency (CVD) was 6.7% (19) among which 14 were male and five were female. Thirteen (4.6%) had deutranomalia, three (1.1%) had deuteranopia and three had protanomalia (1.1%) (table 4).

Table 4. Types of CVD and Gender distribution of CVD

Types of CVD	Males	Female	No. (%)
Deuteranomalia	11 (3.9)	2 (0.7)	13 (4.6)
Deuteranopia	2 (0.7)	1 (0.4)	3 (1.1)
Protanomalia	1 (0.4)	2 (0.7)	3 (1.1)

DISCUSSION

Refractive errors affect a large proportion of population worldwide irrespective of age, sex and ethnic groups. Worldwide, about 27.1 million in the age group of 16-39 years have visual impairment due to uncorrected refractive error despite of the fact that refractive errors can be easily diagnosed, calculated and corrected to attain normal vision.[13,14]

The result of this study also suggests that many undergraduate medical students have eye problems that could interfere with their academic work and performance. The overall occurrence of refractive errors in this study was 51.8%. This finding is consistent with the studies conducted among medical students worldwide.[7-9,14-18] In contrast, other studies have revealed even higher prevalence of eye defects like refractive errors among the medical students than our study.[4,5,19] These differences may be due to ethnic variation, genetic factors, different study population, environment, methodology, non-participation rates and refraction techniques.[20] The high rate of refractive errors in medical students is due to their rigorous academic schedule which spans over five to six years and may be extended over a lifetime.[14]

In our study, simple myopia (25%) was the most common refractive error followed by compound myopic astigmatism (17.6%). It is consistent with the studies conducted in Malaysia and Dominica which have similar findings.[8,21] In contrary, studies conducted in Singapore, Malaysia, Taiwan, Egypt and India, prevalence of myopia was much more higher.[4,5,14,21,22] It is possible that differences in myopia prevalence rates in medical students across different countries may be again attributable to ethnic variations and different genetic predisposition. In addition, heredity and environment also have important roles to play as causative agent for the development of myopia.[4]

The use of computers and digital electronic devices has become mandatory in todays modern society. Today's visual requirements for the university students may include working on electronic devices either at the workplace or at home for prolonged period which is the strongest risk factor for developing dry eye. In this study, 18% of the students had dry eye which is less compared to other studies which

reported 29.2% and 46% respectively.[23,24] This finding may be due to different techniques used for testing dry eye and differences in study population.

Use of computers daily even for three hours has been observed to cause symptoms of dry eye leading to computer vision syndrome.[8] In this study too, Schirmer test value correlated significantly with hours per day use of television, computer and mobiles. This finding was consistent with the findings of Patel et al. where dry eye was observed in 25% of computer users.[25]

This study also investigated the occurrence of color vision deficiency (CVD) in medical students which was 6.7%. This result was in accord with studies done among medical students in Nepal and India.[26-28] However, our prevalence was higher than studies conducted in medical students in other countries.[29-32] The variations in prevalence might be because of differences in study population, geographical location, ethnicity or the techniques used for testing color vision.

Many medical students with CVD remain unaware of their condition and consequently may face issues in their medical education, particularly in identifying color slides, specimens, and in examining certain physical signs. So, early screening of all students is recommended, and proper counseling for medical students with definitive CVD when choosing their specialties for future.[32]

This study reported higher percentage of color blindness among male students which is similar to multiple studies conducted in different geographical regions.[33-35] This male predominance is because of the X-linked recessive trait of the disease.[36]

The present research was a single center based study in medical students hence, the conclusion derived from this study may not be representative data of overall medical and allied health students across the country. A multi-centric study including dental, nursing and medical fraternity would provide a robust inference. Another limitation of this study is recall biases from the participants, especially about the duration spent on studies, sleep and electronic devices as the study was based on the self-declared answers on the questionnaire.

CONCLUSION

Eye defects, like refractive errors, dry eyes and color blindness, are common issues among medical students. They need to be advised for frequent eye check up in order to diagnose eye defects timely and arrest visual impairment at early stage and also educate the students about the ocular hygiene and precautions they need to take and implement in their daily academic activities so that ocular morbidity due to eye defects can be prevented.

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