OCULAR DISORDERS AND ASSOCIATED FACTORS AMONG THE FIRST YEAR HEALTH PROFESSIONAL STUDENTS AT A MEDICAL COLLEGE IN KATHMANDU

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ABSTRACT

The human eye is an important organ as it provides sight and proper coordination in various tasks. The function of the eye is mediated by the 2nd cranial nerve or the optic nerve. Damage to any part of the optic nerve usually results in poor vision, dyschromatopsia (colour blindness), diminished sensitivity to bright light, poor contrast sensitivity, defective afferent pupillary and visual field defects. The commonest ocular disorders are usually attributed to refractive errors such as: myopia, hypermetropia and astigmatism. A healthy eye is necessary for a conducive learning and teaching environment in any academia. Eye screening to rule out any ocular disorder is of utmost importance, especially in medical education, because these students need to be detected early and treated on time to ensure their optimal academic work. Therefore, this study was attempted to determine the proportion of visual disorders among the first year health professional students at Nepal Medical College, and to identify factors associated with it. A total of 115 students were enrolled for this study, where males accounted for 51.3%, while females accounted for 48.7%, respectively. The minimum age was 18 years and maximum was 23 years, with a mean of 19.69 years, and a standard deviation of ±1.14. Almost eight out of ten students (78.3%) had some form of ocular disorders, with many of them having more than one disorder. Females outnumbered the males (51.1%; 48.9%) with respect to the occurrence of eye disorders. The commonest eye disorders were: refractive errors in 60 (52.7%) students, followed by dry eye disease in 23 (20.0%) students, cataract in 2 (1.7%) students, Duane's retraction syndrome in 1, color vision defect in 1 student and 2 students had other manifestations. Based on ethnicity, slightly more than half of the participants were Khas-Aryans (60.0%), while Adibasi-Janjatis and Madhesis had similar participation of 20.9% and 19.1% respectively. More than three quarters of the participants were MBBS students (82.6.%), followed by BDS students (13.0%) and BSc Nursing students (4.4%). The association between ocular disorders and gender was not statistically significant(p value = 0.35). However, a statistically significant association was observed between gender and refractive errors (p value=0.002). There was no association observed between the status of students' refractive error and parental status of refractive error (p value =0.099)

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INTRODUCTION

The human eye is an important organ as it provides sight and proper coordination in various tasks. Eyes have been defined as the 'windows of the soul'. The function of the eye is mediated by the 2nd cranial nerve or the optic nerve. [1] Damage to any part of the optic nerve usually results in poor vision, dyschromatopsia (colour blindness), diminished sensitivity to bright light, poor contrast sensitivity, defective afferent pupillary and visual field defects. The commonest oculo-visual disorders are usually attributed to refractive errors such as: myopia, hypermetropia and astigmatism along with color blindness.[2] A healthy eye possesses the ability to provide clear vision for objects that subtend three minutes of the arc at 6 meter from the viewer, thus classifying the vision as 6/6.[2]

WHO has classified blindness as visual acuity less than 3/60 or its equivalent in the better eye, while visual acuity between 6/18 and 6/60 is known as visual impairment. Globally, 32.4 million people are blind and 191 million have moderate or severe visual impairment, out of which 80% is avoidable.[3] Cataract and refractive errors are the major contributors of avoidable blindness gobally.[3] Errors of refraction particularly myopia, is continuously on the rise worldwide.[4]Visual impairment due to uncorrected refractive errors is common among youths, and is the second most common cause of treatable visual impairment as reported by Pascolini[5] and Bourne *et al*[6] have reported that uncorrected refractive errors is the most common cause of visual disability all over the world.

A healthy eye is necessary for a conducive learning and teaching environment in any academia. Studies on ocular morbidity among school children in Nepal, have reported a prevalence of refractive error between 6.4 to 11.9%.[7-10] Population-based studies in India and Nigeria reported that children and young adults had visual impairment due to uncorrected refractive errors of 61% and 41% respectively, which impeded their economic and social independence.[11,12]

Eye screening to rule out any ocular disorder is of utmost importance, especially in medical education, because these students need to be detected early and treated in time to ensure their optimal academic work. A survey carried out among medical university students in Nigeria showed that 83.3% had ocular problems, out of which 8.3% had low vision.[13] A similar study performed in the Dominican Republic among 200 medical students, revealed that almost half of them (49.5%) had some form of eye defect.[14] Studies from Mangalore and Varanasi, India reported the prevalence of eye defects among university students as 14.9% and 19.6% respectively.[15,16]

In Nepal, there has been no comparable study available in the specialized group of medical students, who are subjected to a lot of visual stress of higher education. In addition, no study that attempts to identify status of ocular disorders among the first year health professional students has been conducted till date. Hence, this study was carried out to determine the proportion of ocular disorders among the first year undergraduate health professional students at Nepal Medical College, and to identify factors associated with it.

MATERIALS AND METHODS

This was a hospital-based, cross-sectional, descriptive study, carried out at the department of Ophthalmology, of Nepal Medical College Teaching Hospital, from July 2021 to March 2022. All newly admitted first year health professional students were included in the study. A total of 115 volunteers enrolled for this study.

Ethical approval was taken from the Institutional Review Committee of Nepal Medical College (NMC-IRC). Informed and verbal consent of each participant was obtained before the study after informing the participants of the purpose of the study and confidentiality of results. Participants were allowed to leave the study at any time.

All students enrolled for this study were asked to provide their socio-demographic data. A detailed history, including history of onset of refractive error, spectacle/contact lens use, and parental history of refractive error were taken. Ocular symptoms, if any, were also noted. All patients underwent a comprehensive eye examination. Visual acuity was recorded monoocularly, on an internally illuminated standard Snellen's chart at 6 meters. Retinoscopy was performed in a dark room at a working distance of 50cm, with the patient fixing on a target at 6 meter. Streak retinoscopy was performed. Those students having defective vision or eyestrain were subjected to subjective refraction. Cycloplegics was not used. Diagnosis of refractive error was made when the magnitude of refractive error was equal to or more than -0.50DSph. Those errors which required only cylindrical correction were considered as

simple astigmatism. Extra ocular motility was tested and strabismus evaluation was done in all students. Anterior segment examination including a detailed examination of the lid, conjunctiva , cornea and lens was done with a Takagi Slit lamp biomicroscope. A dilated fundus examination was carried out with 90D slit lamp biomicroscopy and retinal findings if any were recorded. Colour vision was tested in all students using pseudoisochromatic plates of Isihara. Likewise, Schirmer's test to detect dry eye disease was done in all students.

The obtained data was entered in Microsoft Excel and analyzed with SPSS version 20. Chi square test was used to measure the association between dependent and independent variables. Thus, a p- value of less than 0.05 was deemed as significant.

RESULTS

Of the total of 115 health professional students enrolled for this study, slightly more than half were males (59, 51.3%). The minimum age was 18 years and maximum was 23 years, with a mean of 19.69 years, with a standard deviation of ±1.14. With 95% confidence, it can be asserted that the average age of the first year health professional student ranges from 19.48 to 19.89 years. Six out of ten participants were *Khas-Aryans* (60.0%), followed by *Adibasi-Janjatis* and *Madhesis* who had nearly equal participation (20.9% and 19.1%). More than three quarters of the participants were MBBS students 95 (82.6%), followed by BDS students 16 (13.9%) and BSc Nursing students 4 (3.5%) as shown in Table-1.

Table 1: Socio-demographic profile of the Health Professional students

Age (years)	N	%
18-20	90	78.3
21-23	25	21.8
Gender		
Males	59	51.3
Females	56	48.7
Ethnicity		
Khas-Aryan	69	60.0
Adhibasis/Janjati	24	20.9
Madhesi	22	19.1
Faculty		
MBBS	95	82.6
BDS	16	13.9
B.Sc Nursing	4	3.5

Table 2: Ocular disorders in health professional students

Ocular disorders	n	%
Refractive errors	60	52.2
Dry eye disease	23	20.0
Cataract	02	1.7
Duane's retraction syndrome	01	0.9
Color vision deficiency	01	0.9
Ptosis	01	0.9
Others	02	1.7
Total	90	78.3
Ocular NAD	25	21.7
Grand total	**115**	**100.0**

Ninety students (78.3%) had some form of ocular disorders, with many of them having more than one disorders, however, only 23 of these students (20.0%) had ocular symptoms. Females outnumbered the males (51.1%; 48.9%) with respect to the occurrence of eye disorders, this was not statistically significant (p value=0.351) as shown in Table-3.The commonest eye disorders observed in our cohort were: refractive errors in 60 (52.7%) students, dry eye disease in 23 (20.0%) students, cataract in 2 (1.7%), Duane's retraction syndrome in 1, Color vision defect in 1 and 2 students with other manifestations as depicted in Table-2. MBBS students (66.1%) had the most number of ocular disorders as shown in Table-4.

Refractive error was the most common ocular morbidity occurring in 60 students (52.7%) as shown in Table-2. Among students with ametropia, simple myopia was the most common error observed in 43 students (37.3%), compound myopic astigmatism in 14 students (12.2%) and simple myopic astigmatism in 3 students (2.6%) as seen in Table 5. Hypermetropia was not observed in our cohort. Refractive error was more prevalent among females 36 (31.3%) than males 24 (20.9%). A statistically significant association was observed between gender and refractive errors (p value=0.02) (Table- 6). In an attempt to measure the odds of gender with respect to refractive errors, logistic regression was applied. The fitted equation is: Log [p/1-p]=0.511-1.79 x gender, where the dependent variable is a logit value which represents the odds of being a cause of refractive error. The estimated odds ratio was 0.308 which shows that there is a reduced odd for male students having refractive error. A higher value of – 2 log likelihood (149.65)

Table 3: Association between ocular disorders and gender

Ocular disorders	Gender				Total		P value
	M		F				
	n	%	n	%	n	%	
Refractive errors	25	21.7	35	30.4	60	52.2	
Dry eye disease	13	11.3	10	8.7	23	20.0	
Cataract	2	1.7	0	0.0	2	1.7	
Duane's Retraction syndrome	1	0.9	0	0.0	1	0.9	
Color vision deficiency	1	0.9	0	0.0	1	0.9	0.359
Ptosis	1	0.9	0	0.0	1	0.9	
Others	2	1.7	0	0.0	2	1.7	
Total	45	39.1	45	39.1	90	78.2	
No Ocular disorders	15	13.1	10	8.7	25	21.8	
Grand total	**59**	**52.2**	**56**	**47.8**	**115**	**100**	

Table 4: Association between ocular disorders and faculty

Ocular disorders	MBBS	BDS	BSc Nursing	Total	P value
Refractive errors	51	6	3	60	
Dry eye disease	18	4	1	23	
Cataract	2	0	0	2	
Duane's Retraction syndrome	1	0	0	1	
Color vision deficiency	1	0	0	1	0.739
Ptosis	1	0	0	1	
Others	2	0	0	1	
Total	76	10	4	90	
No Ocular disorders	20	5	0	25	
Grand total	**96**	**15**	**4**	**115**	

Table 5: Types of refractive errors in Health Professional students

Type of refractive errors	MBBS	BDS	BSc Nursing	Total		P value
	n	n	n	n	%	
Simple myopia	37	5	1	43	37.4	
Simple Myopic astigmatism	2	0	1	3	2.6	0.184
Compound myopic astigmatism	12	1	1	14	12.2	
Total	**51**	**6**	**3**	**60**	**52.2**	

Table 6: Association between refractive errors and gender in health professional students

Type of refractive errors	Males		Females		Total		P value
	n	%	n	%	n	%	
Simple myopia	24	20.9	19	16.5	43	37.4	
Simple Myopic astigmatism	0		3	2.6	3	2.6	0.02
Compound myopic astigmatism	1	0.9	3	11.3	14	12.1	
Total	**25**	**21.7**	**35**	**30.4**	**60**	**54.2**	

Students with refractive error		Parents with refractive error		P value
		Present	Absent	
Present	60	30	30	0.199
Absent	55	30	25	

Table 7: Association between status of refractive error of Students and Parents:

compared to χ 2 value (43.77) at 113 degrees freedom (p value=0.05) indicates the existence of non-zero parameters in the larger saturated model.[17]

Table-7 shows the association between the status of refractive error among students and parents. Out of 60 students who had refractive error, parental history was present in 30 parents and absent in 30 parents. Among 55 students who had no refractive error, 30 parents had positive history while 25 had negative history. However, there was no significant association observed between refractive error and parenteral history of refractive error (p value=0.199)

Dry eye diseases were the second most common ocular morbidity observed in 23 (20.0%) students. Males were affected more than females accounting for 11.3% and 8.7%, respectively. This could be due to the frequent use of electronic gadgets, studying in dim light and playing video games which are more common among males than females. Other less common ocular disorders observed in this study were: cataract in 2 (1.7%), Duane's retraction syndrome in 1(0.9 %), ptosis in 1 (0.9%), color vision defect in 1 (0.9%) and other manifestations in 2 students (1.7%).All these disorders were seen in male students. Cataracts observed were developmental, with one posterior polar, and the other post subcapsular cataract. Both students with cataract had optimum best corrected visual acuity, hence their academics were not hampered. Color vision deficiency observed in one student was the red green defect. None of the students in this cohort had visual impairment.

DISCUSSION

Ocular disorders are common among students from primary school level up to university level. This study was attempted to determine the proportion of ocular disorders among 115 undergraduate health professions students at Nepal Medical College, and to identify factors associated with it. Almost eight out of ten students (78.3%) had ocular disorders. This finding is consistent with that of a study carried out among medical university students

in Nigeria which showed that 83.3% had ocular problems.[13] Our study was however different from a study performed in the Dominican Republic, which reported a lower prevalence of ocular morbidity of 49.5% among medical students.[14] This may be due to the difference in the sample size in our studies, our study included 115 volunteers, while theirs recruited 200 volunteers. Studies from Mangalore[15] and Varanasi,[16] India also reported a low prevalence of ocular disorders among university students as 14.9% and 19.6%, respectively.[15-16] This could be due to the difference in the study population in our studies.

In this study the age group of the students ranged from 18 to 23 years, which was similar to studies, reported from Nigeria,[13] the Dominician Republic[14] and Mangalore,[15] India. However, this differs from the study in Varanasi,[16] where the age ranged from 15 to 45 years. This is because it was a study carried out on a large population comprising of students from different faculty (science, art and social sciences). Our study reported a participation of 59 (51.3%) males and 56(48.7%) females, with a slightly high male preponderance. A high preponderance among males were seen in studies reported by Nwosu et al[13] and Maurya et al,[16] whereas females were more in studies conducted by Otohinoyi et al[14] and Niharika et al.[15]

The distribution of ocular disorders in this study were: refractive errors in 60 (52.2%) students, dry eye disease in 23 (20.0%) students, cataract in 2 (1.7%) students, Duane's retraction syndrome in 1, color vision defect in 1 and 2 students with other manifestations. This pattern was similar to studies reported by Nwosu et al,[13] Otohinoyi et al[14] and Niharika et al[15] and Maurya et al,[16] but in contrast to studies done in school children and young adults where refractive errors was followed by conjunctivitis , and vitamin A deficiency.[7-12]

Refractive error was the most common ocular morbidity reported in our study, occurring in 60 (52.2 %) students. This study concurs with a study from Nepal which reported a prevalence of 51.4% of refractive error among medical students,[32] and between 54%

to 74% from studies in India.[22-31] Studies by Nwosu *et al*[13] and Maurya *et al*[16] reported a prevalence of refractive error as 63.0% and 39.8% respectively. Our study differs from studies conducted by Chow *et al*[18] and Lin *et al*[19] which reported a high prevalence of refractive error among medical students of 82% and 90%, respectively. This may be because of the difference in the ethnic groups in our study population, where people of Chinese descent have a higher prevalence of refractive error compared to our ethnic groups.

Among students with ametropia, simple myopia was the most common error observed in 43 students (37.3%), compound myopic astigmatism in 14 students (12.2%) and simple myopic astigmatism in 3 students (2.6%). This study showed that simple myopia was the commonest type of refractive error accounting for 37.3% which is in accord with studies in Varanasi[16] and the Dominician Republic [14] which reported myopia of 21.4% and 30.5 %, respectively. Studies from Denmark and Norway showed that 50% and 50.3% of medical students had myopia respectively, which concurs with our study.[20,21] The long and extensive study regimen of a medical school involves a lot of near-work, which could possibly explain the high myopia rates in medical students. Hypermetropia was not observed in any student in our cohort which coroborates to the study from Nigeria. [13] Females 36(31.3%) had a higher proportion of refractive error in our study which concurs with a study (35.7%) from the Dominican Republic.[14]

Dry eye diseases were the second most common ocular morbidity observed in 23 (20.0%) students. This differs from the study from Varanasi where dry eye disease was reported in 10.5% of students. A high proportion of medical students in Gandaki Province in Nepal were found to be having dry eye disease accounting for 46.0%.[33] The difference in our studies could be due to the difference in sample population as well as environmental factors. Dry eye disease is widely prevalent in medical students worldwide due to long hours of study and extensive near work. With the increasing trend in digital classrooms due to the COVID- 19 pandemic, dry eye disease is on the rise. Males were affected more than females by dry eye disease as shown in our study. This could be due to male students having more tendency of late night study, use of more electronic gadgets and playing video games more than their female counterparts.

Other less common ocular disorders observed in this study were: cataract in 2 students (1.7%),

Duane's retraction syndrome in 1 student, (0.9 %), ptosis in 1 student (0.9%), Color vision defect in 1 student (0.9%) and others in 2 students (1.7%). All these disorders were seen in male students. Cataract observed in our study was developmental type with one posterior polar and the other post subcapsular. Both these students had optimum best corrected visual acuity which did not hamper their academics. The student with color vision deficiency had a red green defect.

In conclusion, ocular morbidity was seen in 78.3% of health professions students with MBBS students having the highest prevalence. Refractive error, among which simple myopia was the most common ocular morbidity, with females being more affected than males. A statistically significant association was observed between gender and refractive errors. There was no significant association however, between refractive error and parenteral history of refractive error. Majority of the ocular disorders observed in our study were treatable and none of the students had visual impairment.

Hence, a comprehensive eye examination is recommended for all newly admitted health professional students to enable the detection and treatment of any ocular disease that may impede their optimal academic pursuit. To reduce ocular morbidity among health professional students, regular eye check up on an annual basis, correction of refractive errors and health education towards eye care are strongly advocated.

ACKNOWLEDGEMENT

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