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Pattern of Ocular Morbidities Among First Year Students in a Public University in Ghana

Bright Asare-Bediako[1], Mohammed Abdul-Kabir[1], David Ben Kumah[1], Benjamin Brifa Bempong[1]

[1]Department of Optometry and Visual Science, B21 COS Building, KNUST-Kumasi.

Corresponding Author: Bright Asare-Bediako, Department of Optometry and Visual Science, B21 COS Building, KNUST-Kumasi, **Tel:** +233547494802; **Email:** sktflight@gmail.com

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ABSTRACT

Background: Studies have shown that ocular morbidities are a major public health problem in developing countries like Ghana. Information on ocular morbidity among university students is limited in literature. This study sought to outline the pattern of ocular conditions affecting first year students in a public university in Ghana.

Methods: 229 students were sampled. Eye examination procedures included history taking, visual acuity measurement, pinhole acuity test, non-cycloplegic refraction, external eye examination, anterior and posterior segment examinations. Statistical analysis was done using STATA. P-values less than 0.05 were considered statistically significant.

Results: 204 students took part in the study, with a male to female ratio of 4:1. The prevalence of ocular conditions among the students was 39.22%, with the most prevalent being allergic conjunctivitis (13.24%), followed by refractive error (12.75%), then others and bacterial conjunctivitis with 12.25% and 0.98% respectively. The mean age was 20.56 ± 1.51 years. Only 10.29% had had an eye examination within less than a year, and 40.69% of the students had never had an ocular examination before.

Conclusion: The prevalence of ocular morbidity was high. Public health efforts should be instituted so that at least first year students admitted into the university for each academic year undergo a comprehensive eye examination.

KEYWORDS

Last Eye Examination; First Year Students; Public University.

INTRODUCTION

Vision is the most important human sense for every student, especially for students in tertiary institutions where academic performance involves a lot of reading and research. It is generally claimed that visual input accounts for 75% of information acquisition [1]. As such, the existence of any ocular condition that causes poor vision or inhibits the comfortable use of the eyes could have negative impact on the student's academic performance. It is therefore important that students admitted into universities to pursue various programs have optimal comfortable vision.

Ocular morbidity refers to a condition in a study subject, recognized or suspected, ocular or vision abnormality, which require treatment or surveillance [2]. Studies have shown that ocular morbidities are a major public health problem in developing countries like Ghana, where about 90% of the world's visually impaired people live [3].

Visual problems have been known to lead to 4-8% slower per-

formance on occupational tasks [4]. Students suffer varieties of symptoms of these visual problems, which are frequently associated with near work (reading and writing) whereby eye accommodative and vergence processes are more intense [5]. These asthenopia symptoms such as burning such as burning sensations, eye strain, tearing and photophobia can be severe enough to limit personal activities and further result in the development of age related eye disease [6]. A study by Rafindhadi et al revealed that most subjects who suffered ocular morbidity were students, and the least were farmers [7].

A common ocular condition affecting students is refractive error. For example, higher education has been found to correlate with long hours of near work (reading and writing), and this environmental factor has been found to contribute to the development of myopia [8]. Thus, if myopic students admitted into the university are uncorrected, the exposure to long hours of near work may progress the refractive error (as shown by a 5-year longitudinal study in one university and cause more vision problems. Other studies have also reported on ocular problems affecting students such as refractive error allergic conjunctivitis, which has been found to be a leading cause of absenteeism from school and computer vision syndrome [9-11]. With the advent of technology, students are glued to computer screens for the majority of their academic work and entertainment. This excessive use of computer comes with it visual and ergonomic problems. Headache, burning sensation in eyes and dry/tires/sore eyes were the most common visual related problems associated with usage of computers in one study [12]. The discomfort associated with computer usage has not yet been proven to result in permanent ocular damage, but may cause a reduction in work accuracy and this can reduce productivity by as much as 40% [12, 13]. Cataract, refractive errors, glaucoma, diabetes and injuries have been shown to be causes of blindness in middle age but more importantly in age group 20 to 40 years, and this happens to be the age group for most undergraduates [14].

Unfortunately, information on the distribution of ocular conditions among students in tertiary education is very limited, particularly for developing countries. However, the few studies on selected ocular conditions among university students have recorded significant problems [15]. It is important that these and other non-blinding morbidities are detected at the earliest to reduce the possible complications. The good news is, many ocular problems that are amenable to interventional measures are detected through vision screening of selected populations [16-18]. The purpose of this study was to outline the pattern of ocular conditions among students who have been admitted into first year programs in the Kwame Nkrumah University of Science and Technology (KNUST) for the 2014/2015 academic year.

MATERIALS AND METHODS

Study Design and Sampling

The research was designed as a cross-sectional, randomized study of all first year KNUST students for the 2014/2015 academic year residing in the halls of residence. Simple random sampling was used to randomly select three out of the six halls of residence and then three floors in each of the sampled halls for the study. On each sampled floor, systematic random sampling was used to select the rooms, starting from the first room, for the study. Each student in a sampled room who satisfied the inclusion criteria was eligible to partake in the study. The total number of students sampled was determined to be 167, using Epi Info version 7.1.4.0, an expected prevalence of 19.6% and a confidence level of 90% [19].

Screening Procedure and Data Collection

An informed consent was obtained from each student sampled. For each student who consented to the study, a detailed clinical history was taken. The clinical history covered presenting complains, past ocular history and general medical history as well as family ocular history and family medical history. After the clinical history, visual acuity was recorded, with and without prescription if any, using a 6-metre Snellen chart. For visual acuities less than 6/9, the pinhole test was performed from the same distance. If the visual acuity improved with pinhole, non-cycloplegic refraction was performed. External examination was performed with a pentorch, followed by anterior and posterior segment examination as well as fundus examination using a direct ophthalmoscope. All findings obtained were recorded on examination forms designed for this study and diagnoses made accordingly. Subjects who required further examination and management were referred to the University Hospital Eye Clinic for further examination and care.

For purposes of this study, refractive error was defined as uncorrected visual acuity of less than 6/9 which improved with pinhole. Refractive error of -0.50DS or more was diagnosed as myopia, +1.50DS or more as hyperopia and 0.75DC or more as astigmatism.

Ethical Consideration

The study was approved by the Department of Optometry and Visual Science, and then reviewed and approved by the Committee on Human Research, Publications and Ethics of the Kwame Nkrumah University of Science and Technology,

School of Medical Sciences. A written approval was obtained from Hall Masters and Senior Tutors of each of the sampled halls of residence, confirming their approval and permission to conduct the study in the respective halls. Informed consent for non-invasive ocular examination was obtained from all subjects who took part in the study.

Data Management and Analysis

Completed examination forms were cross-checked in the field for completeness of data. Data was analyzed using STATA for Windows, version 16.0. Frequency and distribution tables were constructed, as well as graphs drawn using Microsoft Excel (Microsoft Office Professional Plus 2010) as descriptive statistics. Continuous variables were expressed as mean ± standard deviation (M ± SD). Chi-square test was employed to find significant differences between comparable categorical groups. Statistical significance was set at p values less than 0.05 ($p < 0.05$).

RESULTS

Demographics and Distribution of Ocular Conditions

Out of 229 students sampled, 204 took part in the study, representing a response rate of 89.1%, with a male to female ratio of 4:1. The mean age of subjects was 20.56 ± 1.51 years, with 17 years and 26 years being the minimum and maximum ages respectively. The age and sex distribution is shown in table 1.

Table 1: Distribution of age and sex of study participants

Sex	Age group			
	17-20	21-23	24-26	Total
Male	89	75	7	171
Female	24	6	3	33
Total	113	81	10	204

The prevalence of ocular conditions among the students was 39.22%. The most prevalent condition was allergic conjunctivitis (13.24%), followed by refractive error (12.75%), then others and bacterial conjunctivitis with prevalence of 12.25% and 0.98% respectively. The distribution of ocular conditions is shown in Table 2.

Table 2: Distribution of ocular conditions among study participants

Ocular condition	Overall frequency (%)	Frequency in males (%)	Frequency in females (%)
Allergic Conjunctivitis	13.24	11.70	21.21
Refractive Error	12.75	11.70	
Bacterial Conjunctivitis	0.98	18.18	6.06
Others	12.25	12.87	9.09

The prevalence of ocular conditions in males (36.26%) was significantly lower than that of females (54.54%) ($p = 0.03$) and was highest among students within the age group 24-26 years (50%). The category 'Others' comprised of diagnoses of suspicious optic discs (suspicious for glaucoma), dry eyes, computer vision syndrome, pseudomyopia and binocular vision anomalies. These were categorized as 'Others' because even though subjects reported some signs and symptoms consistent with the conditions, there were no standard tests available on the field to confirm and ascertain their magnitudes due to inadequate resources. Of this category, 20%, 28%, 10%, 40%, 4% and 8% were diagnosed of suspicious optic discs, dry eyes, computer vision syndrome, pseudomyopia and binocular vision anomalies respectively. Suspicious optic disc was diagnosed when at least two of large cup (cup-to-disc ratio more than 0.5), peripapillary beta-atrophy and disc hemorrhage were observed. Computer vision syndrome was diagnosed in subjects with visual acuity of 6/9 or better in each eye presented with complains of at least two of tearing, redness and mild ocular pains with prolonged use of a computer. Pseudomyopia was suspected in subjects with visual acuity of 6/9 or better with complains of poor distance vision in the evening. The only binocular vision anomaly diagnosed was accommodative insufficiency in subjects with visual acuity of 6/9 or better with amplitude of accommodation lower than expected for the age.

The mean number of conditions diagnosed per student was 0.44 ± 0.04. The distribution of number of conditions diagnosed in each age group is shown in Table 3.

Table 3: Number of conditions diagnosed in each age group

Age group	Number of conditions diagnosed		
	0	1	2
17-20	70	38	5
21-23	49	27	5
24-26	5	5	0
Total	124	70	10

The prevalence of ocular conditions appeared to increase with age, but was not statistically significant ($p = 0.78$). Also, no significant relationship ($p = 0.76$) was found between age and number of conditions diagnosed.

Of those with refractive error, 52% had myopia, 28% had astigmatism and 20% had hyperopia. The mean refractive error was -0.77 ± 0.28DS. The mean myopia, astigmatism and hyperopia were -1.55 ±0.23DS, -1.00 ±0.11DC and +1.75 ±0.11DS respectively. The maximum magnitudes of myopia, astigmatism and hyperopia recorded were -2.00DS, -1.50DC

and +2.00DS respectively while the minimum values were -0.50DS, -0.75DC and +1.50DS. Though refractive error was found in more males than females, the relationship was not statistically significant (p = 0.18) and is shown in Table 4.

Table 4: Distribution of type of refractive error among study participants.

Refractive Error	Males (%)	Females (%)	Total (%)
Myopia	8 (42.11)	5 (83.33)	13 (52.00)
Hyperopia	5 (26.32)	0 (0.00)	5 (20.00)
Astigmatism	6 (31.58)	1 (16.67)	7 (28.00)

Only 19.23% of students with refractive error wore spectacles for correction.

Distribution of Number of Years for Last Eye Examination (Lee)

40.69% of the students had never had an ocular examination before, 29.9% had an eye examination more than 5 years ago, and 18.62% had and eye examination in less than 3 years. Only 10.29% had had an eye examination within less than a year before starting the first semester. This distribution is shown in Table 5.

Table 5: Distribution of last eye examination (LEE) among study participants.

Period of last eye examination	Frequency (%)	Males (%)	Females
Less than 1yr	21 (10.29)	18 (10.53)	3 (9.09)
1-2yrs	17 (8.33)	9 (5.26)	8 (24.24)
3-5yrs	22 (10.78)	19 (11.11)	3 (9.09)
More than 5yrs	61 (29.9)	54 (31.58)	7 (21.21)
Never	83 (40.69)	71 (41.52)	12 (36.36)

The number of conditions diagnosed significantly increased with increasing period of LEE (p = 0.04) and is shown in Table 6.

Table 6: Distribution of number of conditions diagnosed and period of last eye examination.

Period of last eye examination	Number of conditions diagnosed in this study			
	0	1	2	Total
Less than 1yr	8	10	3	21
1-2yr	6	9	2	17
3-5yr	15	7	0	22
More than 5yr	37	21	3	61
Never	58	23	2	83
Total	124	70	10	201

In all, 56.25% of students who responded having eye problems before starting school did not visit any eye clinic for intervention, and 73.75% of students who reported having eye problems before starting school were diagnosed of at least one ocular condition. A positive association was found between having eye problems before starting school (in the first semester) and being diagnosed of at least one ocular condition in this study (conducted in the second semester) which was statistically significant (p = 0.032).

DISCUSSION

This research is the first to study general ocular conditions among university students in the country. The prevalence of ocular conditions found in the students was 39.22%. This was significantly higher than that found by Maurya et al. [19] (19.6%), which happens to be the only study found in literature that considered general ocular conditions among university students. The difference could be attributed to the relative smaller sample size of this study (229 against 20680) and the different racial background of students in this study (only Africans). Unlike the study by Maurya et al. [19], no significant relationship was found between the prevalence of ocular conditions and age. This is probably due to the relative smaller sample size and narrower age range of this study.

The commonest ocular condition diagnosed was allergic conjunctivitis (13.24%) followed by refractive error (12.75%) which was the other way round in the study by Maurya et al. [19]. This could be attributed to differences in environment, as the numerous dusty environments in Ghana might have exposed students to higher amounts of allergens on the ocular surface, especially because the students had just resumed from Christmas break. Also, poor ocular hygiene among the students could be a factor. The prevalence of refractive error was found to be lower (12.75%) than that recorded by Maurya et al. [19] (39.78%). This could be due to differences in sample size, diagnostic criteria and also the fact that the study in India included continuing students, who had been exposed to extensive near work thereby recording higher myopia rates which might have increased the refractive error prevalence in that study.

The commonest refractive error was myopia, followed by astigmatism and then hyperopia. It is important to note that the low prevalence of refractive errors still poses a problem for such students who have just began tertiary academic studies. A study showed that even low degrees of refractive errors (with presenting visual acuity of 6/6 and 6/9) are associated with headache [20]. It was beyond the scope of this study to investigate the association between refractive errors and symptoms such as headache among these students. However,

it has been reported that even low astigmatism, such as reported in this study, causes changes to visual perception that alter the hyper-excitability in the visual cortex of the brain of headache sufferers, exacerbates the perception of striped patterns which are thought to be important in the visual triggers of different types of headaches and that some patients with headache demand low degrees of refractive error correction [21-24]. It has been observed very frequently that a careful eye examination and a possible correction of the defect reduce headache symptoms [25]. Hence, it is important that these students with varying degrees of refractive errors are identified and corrected to avoid the negative influence it could have on their academic life.

The prevalence of ocular conditions significantly increased with increasing period of last eye examination and was higher in students who responded that they had eye problems before starting school (in the first semester). This suggests that those students with ocular symptoms who did not visit the clinic (when school began) might still have been suffering their symptoms, and also, those who visited the eye clinic before school might have developed new symptoms that may require intervention. Barriers such as financial constraints and misconceptions about eye care (such as spectacles worsen vision) may have blocked the participants' access to eye care services. This strongly outlines the need for a comprehensive eye examination for first year students, at least before they start the first academic year in school because first year students do not undergo any comprehensive eye examination but just a visual acuity assessment as part of their medical screening in most universities in developing countries. With a comprehensive eye examination, these ocular problems could be detected and remedied before students even begin academic work.

Limitations and Further Studies

The smaller sample size of this study is recognized as a significant limitation. Constraints by limited resources allowed sampling of only three out of the six halls of residence for the study. Hence, not all students in each hall were represented in this study, and this could affect the prevalence reported in this study. It would be worthwhile if further studies ensured that students in each of the halls of residence are adequately represented in the sampling process.

CONCLUSIONS

The study showed that the first year students suffered considerable ocular morbidity, partly because most of them had not had their eyes examined by a professional their whole life. It adds to existing information from similar studies that university students suffer ocular morbidities, most of which are not immediate causes of blindness but could hamper comfortable academic work. It is therefore important that public health efforts are instituted so that at least first year students admitted into the university for each academic year undergo a comprehensive eye examination and eye health education, at least before they start academic work in school. This would go a long way to identify and treat eye problems which would otherwise have negative impact on their academic performance.

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