

Prevalence of Myopia among Senior High School Students in the Kumasi Metropolis

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Abstract

The study aimed at determining the prevalence of myopia, the age and gender distribution of myopia, and the number of students who show symptoms of myopia in Senior High School students in the Kumasi metropolis.

Method: A total of 662 students aged 14-20 years were randomly screened from 12 different Senior High schools in this descriptive cross-sectional study. Data were collected through interviewer-administered questionnaires, ophthalmic examination and refraction. Myopia was defined as the best vision sphere ≥ -0.25 DS.

Results: The study revealed a myopia prevalence of 25.08% (14.20% in females) and a mean myopia of -2.72 ± 0.21 DS (-2.84 ± 0.18 DS for females) among these students. Majority of the myopic cases (66.26%) were found in ages 16 and 17. Myopia was positively correlated with blurred distance vision ($r=0.504$, $p<0.05$).

Conclusion: The study revealed significant prevalence of myopia which may continually increase if adequate intervention measures are not put in place.

Keywords: Myopia; Prevalence; Squint; Vision; Error

Introduction

Myopia is a form of ametropia or refractive error in which parallel light rays from an object at optical infinity are focused by the refractive media of the eye to a focus in front of the retina, with accommodation fully relaxed [1]. Myopes have blurred distance vision but the object becomes clearer as it gets closer. Myopes squint (thus slightly close their eye so reduce palpebral aperture) for distance object in order to create a pinhole effect there by reducing spherical aberrations to create clearer image. Some common symptoms include: blurred distant vision, squinting, nausea and fatigue. Patients with myopia are more at risk of developing retinal detachment, primary open angle glaucoma, chorioretinal atrophy, lacquer cracks, (sub capsular, cortical and nuclear) cataract and myopic macular degeneration than patients with hyperopia [2-8] cause and therefore may be considered to be a multi factorial in origin [9]. Among many risk factors associated with myopia, doing a substantial amount of near work on a regular basis also increase the risk for myopia. Myopia is associated with greater times pen treading and doing near work, more years of education, better reading test scores, occupations that require a great deal of near work and greater academic ability [10-13]. The problem of myopia is often discovered in school-age children who report having trouble

seeing the chalkboard. Myopia becomes progressively worse through adolescence and stabilizes in early adulthood. Infants are mostly born hyperopic and they become less so with the approach towards ametropia [9]. It has been reported that the prevalence of myopia is heightening in both developed and developing countries [14,15]. In school-age and young adult, the prevalence of myopia is estimated to be 20-25% in the mid to late teen age population and 25-35% in young adults in the United States and developed countries [16,17]. In developed countries, screening of eyes in school children is done routinely. Eye services are easily accessible, and the majority of children with eye problems consult them without requiring referral by other health professionals [18]. In Ghana like other developing countries, there is no established vision screening program for students on commencement of school, such that those with early onset of such errors will have many years of poor vision. Moreover, it is often difficult to provide an efficient refraction service for a variety of reasons including lack of awareness about the prevalence and public health importance of eye diseases and most importantly recognition of refractive error as a correctable cause of visual impairment in students, compounded by the non-availability of affordable services. The proportion of children who are blind or

visually impaired due to refractive errors (with myopia being the most prevalent) can be used to assess the level of development of eye care services in a country [19-21].

Despite the fact that myopia is such serious problem, only a few papers have been published so far on the prevalence of myopia among school children in Ghana [22-24] as well as hospital based research [25-27]. All these publications report significant prevalence of hyperopia and show a growing need to tackle this problem. The study aimed at determining the prevalence of myopia, the number of students who show symptoms of myopia and the age and gender distribution of myopia in Senior High School students with in the Kumasi metropolis.

Methods

Study design and participant selection

A descriptive cross-sectional study was adopted in for this population survey to determine the prevalence of myopia in Senior High school students in the Kumasi metropolis. Twelve (12) Senior High schools (5 mixed schools, 3boys’ schools and 4girls’ schools) were randomly selected among all Senior High Schools in the Kumasi metropolis. A total of 662 study subjects, out of the 731 students who returned their signed informed consents, were present on the days of screening and participated in the study. The students and principals of these selected Senior High schools were contacted and informed consent obtained after a detailed explanation of the purpose, content and benefit of the study. The information exchanged between the respondents and there searcher was confidential and were kept as such. Ethical approval was obtained from the Ethics Review Board of the Department of Optometry and Visual Science, Kwame Nkrumah University of Science and Technology, and the study complied with the principles of the Declaration of Helsinki.

Pre-survey stage/pilot project

In a bid to test the adequacy of their search instruments, a pilot study was organized at Kwame Nkrumah University of Science and Technology (KNUST) Senior High School.

Data collection technique

Data were collected by optometry students who were killed in measuring all the parameters of interest while the principal investigator ensured that the testing protocol was adhered to. Prior to the ophthalmic examination, a questionnaire(for patient history) was given to the students to capture demographic information (age, sex, address and telephone number) and also together information about their chief complaint, visual function, date of last eye examination, knowledge of refractive status, spectacle wear, ocular and systemic health as well as the life style of the student. A thorough ophthalmic examination/eye screening was carried out in all the students randomly selected in the selected schools. The screening procedure included the following: Visual acuity measurement, Ophthalmoscopy and subjective refraction. In this study, myopia was defined as the best vision

sphere power of ≥ -0.25 DS.

Data analysis

The data was analyzed using the Statistical Package for Social Sciences (SPSS Inc., Chicago, Illinois, USA) version 12.0 and Microsoft Excel 2007 (Microsoft, Redmond, Washington, USA) after the data collected had been checked for completeness of answers and accuracy. Associations in the categorical variables were determined using Chi-Square test. Paired t-test was used to assess the difference in myopia between males and females in the study. Pearson correlation was used to assess the relationship between myopia and the reported symptoms. P-value less than 0.05 were considered significant.

Results

Demographics of the study population

Table 1: The distribution of participants with their schools.

Name of Senior High School	Number of students
Opoku Ware	56
Kumasi Girls’	54
Serwaa Nyarko	61
Asante man	67
Kumasi High	50
Prempeh	57
Kumasi Anglican	41
Ahmadiyya	43
Kumasi Wesley Girls’	41
KNUST	64
Adventist Day	77
Yaa Asantewaa Girls’	51

Boys School

Girls’ School

Mixed School

In all, 662 out of the 731 students who submitted their informed consents were screened. The mean age for the study population was 16.16 ± 2.60 years (age range =14 to 20 years, with 376(56.8%) being males). A breakdown of the distribution of the participants with their schools and gender distribution of participants are shown in (Table 1). From this point onwards, results belonging to the myopic population alone were reported. Out of the 662 respondents, 166 had myopia representing a prevalence of 25.08%. 72 (43.37%) of the myopic population were males. The mean myopia found in this study was -2.72 ± 0.21 DS

(with a range from -0.25DS to -6.00DS). The mean myopia in the male and female myopic groups was -2.60 ± 0.24 DS and -2.84 ± 0.18 DS. The difference in mean myopia between the male and female groups was not significant ($p=0.67$). Majority of the myopic cases (66.26%) was found in the ages of 16 and 17 years. (Table 2) shows the distribution of myopia by age and gender. (Table 3) shows the distribution of symptoms by gender within the myopic subgroup of the study population. The most frequent symptom was blurred distance vision ($n=157$, 94.57%). (Table 4) shows the age distribution of certain symptoms recorded from the respondents. The highest frequency of myopic symptoms was recorded for students aged 16 and 17 years.

Table 2: Age and Gender distribution of myopia.

Age(years)	Gender		Total (%)
	Males	Females	
14	5	1	6 (3.61%)
15	9	12	21 (12.65%)
16	16	38	54 (32.53%)
17	33	23	56 (33.73%)
18	6	15	21 (12.65%)
19	2	4	6 (3.61%)
20	1	1	2 (1.20%)
Total (%)	72 (43.37%)	94 (56.63%)	166 (100%)

Table 3: Gender distribution of symptoms among myopic patients (n=166).

Symptoms	Gender		Total
	Females	Males	
Blurred distance vision	89 (53.61%)	68 (40.96%)	157 (94.57%)
Squint	85 (51.20%)	64 (38.55%)	149 (89.75%)
Headaches	62 (37.35%)	57 (34.34%)	119 (71.69%)
Blurred distance vision and squint	82 (49.40%)	59 (35.54%)	141 (84.94%)
Blurred distance vision and headaches	60 (36.14%)	51 (30.72%)	111 (66.87%)
All 3 symptoms	48 (28.92%)	34 (20.48%)	82 (49.40%)

Table 4: Age distribution of the symptoms.

Age (Years)	14	15	16	17	18	19	20	Total (%)
Frequency	6	21	54	56	21	6	2	166 (100)
Blurred Distance Vision	4	21	52	55	19	5	1	157 (94.57)
Squint	4	20	50	52	18	4	1	149 (89.75)
Headaches	1	17	39	46	12	4	0	119 (71.69)
Blurred distance vision and squint	3	18	49	50	17	3	1	141 (84.84)
Blurred distance vision and headache	1	15	35	45	12	3	0	111 (66.87)
All 3 symptoms	1	8	29	37	6	1	0	82 (49.40)

Discussion

The prevalence of myopia in this study (25.08%) was low compared to 55.7%, 83%, 42% and 68% reported by El-Bayoumey et al. In Cairo, Chenetal. In Taiwan, Goh & Lamin Hong Kong, and Fangrunetal. In Shanghai. [20,28-30]. This confirms studies which have indicated that myopia is more prevalent in Asians than Africans. This high prevalence of myopia among Asians has been attributed to the intensive educational systems that demand more near work from Asian school children [31-33]. Other similar studies in Ghana compared to this study reported lower prevalence of myopia. This could probably be due to the definition of myopia in those studies (≥ -0.50 DS compared to ≥ -0.25 DS in the current study) and the different populations studied [22-24]. On the other hand, the prevalence of myopia in this study was higher than that among secondary school students in Mwanzacity, Tanzania which reported a prevalence of 5.6% [34]. Studies have found equivocal results regarding the difference in the prevalence of myopia among males and females [9,22,27,35,36]. In this study, there was no significant difference in the prevalence of myopia between the males and females ($p>0.05$). The mean myopia in females was slightly higher than that of the males. However, the difference in mean myopia between the male and female groups was not significant ($p=0.67$). Kumah reported a lower percentage of myopia among boys in Atwima the Ashanti region of Ghana [22]. Reasons given to account for this were that, females grow rapidly than males and also tend to read and write more than males. The subsequent increase in near work predisposes them to myopia development as seen in you then set myopia [9]. Koomson et al. [27] reported a higher prevalence estimate in males than in females. There reason given was that, sex-related difference of myopia is not certain but could be due to the relative differences in response to health seeking behavior. Also, it could be that males do more jobs requiring corrected myopia than females.

A total of 94.57% of the myopic respondents complained of blurred distance vision while 71.69% complained of headaches. The difference in symptoms reported between the males and females was not significant for each of the symptom category

($p > 0.05$). Pearson's correlation revealed a positive significant association between myopia and blurred distance vision ($r = 0.504$, $p < 0.05$). There was no correlation between myopia and all the other symptom categories ($p > 0.05$). The complaint of headache is not usually associated with true myopic patients with the exception of pseudomyopia and some forms of induced myopia. If asthenopia is present in a patient with myopia, it is usually due to some other cause, such as astigmatism, anisometropia, an accommodative dysfunction, or a vergence disorder, thus headache is not pathognomonic of pure myopia [37]. There was a significant difference of myopia occurrence among the age groups, similar to what was reported by Kumah in 2007 ($p < 0.05$) [22]. In this study, the students between the 15 to 18 year brackets had the highest prevalence of myopia (91.56%), of which 32.53% and 33.73% were 16 and 17 years respectively. This was so because the majority of the respondents were 16 and 17 years, which was comparable to other studies. Apart from myopia being inherited, students tend to do more extensive near work like reading textbooks, watching TV, playing video games, browsing the net, among others, due to the socio economic growth and changes. This has contributed to the increase in the prevalence in these ages. Most of respondents (80%) were not aware of their refractive status. This was probably due to the fact that most of them had not taken an eye examination before, a common occurrence among developing countries [38]. This is similar to low proportions of students who have had eye examinations before in several studies conducted in most developing countries in Africa [23,24,28,34,39]. For the few who had spectacle corrections (2%), most of them were reluctant in using their corrections for they wanted to be accepted by their peers and also for some perceived probable side effects associated with lens wear. For instance, some people don't appreciate their appearance and they think it detracts from their facial aesthetics or hides their features [40].

Conclusion

This study has revealed a significant prevalence of myopia among senior high school students in the Kumasi metropolis. It is likely that both the rate and severity of myopia will increase as a result of the rapid socio economic growth of Kumasi and Ghana as a whole, if the needed efforts are not taken to put its progression under control. Myopia is considered as one of the important medical, social and public health issues that need to be addressed in Kumasi and other regions in Ghana. We commend that a policy be put up by the Ghana Education Service which will allow the inclusion of pre-school and a routine in-school eye screening for all levels of education. Through the school health education programmers of the Ghana education service, students, teachers and the communities should be educated on the importance of ocular health. They should be trained to identify the different refractive states of the eye, especially myopia; its signs, symptoms and complications so that they can report to the appropriate quarters for the appropriate assessment and management.

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