

Prevalence Refractive Errors among Medical Students of Qassim University, Saudi Arabia: Cross-Sectional Descriptive Study

Sultan H. Al-Rashidi*, Adel A. Albahouth, Waleed A. Althwini, Abdullah A. Alsohibani, Abdulmejeed A. Alnughaymishi, Abdulamlaik A. Alsaeed, Fahad H. Al-Rashidi, Salem Almatrafi

Department of Ophthalmology, College of Medicine, Qassim University, Buraidah, Saudi Arabia

Abstract

Citation: Al-Rashidi SH, Albahouth AA, Althwini WA, Alsohibani AA, Alnughaymishi AA, Alsaeed AA, Al-Rashidi FH, Almatrafi S. Prevalence Refractive Errors among Medical Students of Qassim University, Saudi Arabia: Cross-Sectional Descriptive Study. Open Access Maced J Med Sci. <https://doi.org/10.3889/oamjms.2018.197>

Keywords: Errors of refraction; Myopia; Hyperopia; Young adults

***Correspondence:** Sultan H. Al-Rashidi, Department of Ophthalmology, College of Medicine, Qassim University, Buraidah, Saudi Arabia. E-mail: sultanalrashidi97@gmail.com

Received: 17-Feb-2018; **Revised:** 08-Apr-2018;
Accepted: 09-Mar-2018; **Online first:** 19-May-2018

Copyright: © 2018 Sultan H. Al-Rashidi, Adel A. Albahouth, Waleed A. Althwini, Abdullah A. Alsohibani, Abdulmejeed A. Alnughaymishi, Abdulamlaik A. Alsaeed, Fahad H. Al-Rashidi, Salem Almatrafi. This is an open-access article distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC 4.0)

Funding: This research did not receive any financial support

Competing Interests: The authors have declared that no competing interests exist

OBJECTIVE: To study the prevalence of various errors of refraction among the medical students studying at the college of medicine, Qassim University, Saudi Arabia.

METHODS: This is a cross-sectional descriptive study conducted at Qassim University clinics over a period of two months. The study population comprised 162 male and female students from different academic years. The students were selected randomly so that around 35-40 students were taken from each academic class. The selected study population was explained the objectives of the study and a written consent form that stated the purpose, methods, risks, benefits, and the assurance of the confidentiality of the data was obtained from each student. After giving the consent, each subject was examined by auto refractometer. The examination was carried out by an optometrist without using cycloplegia. Both right and left eyes were thoroughly examined by auto refractometer and on the average three readings of the refraction measurements were taken. The readings were recorded on a data sheet of every individual, and the Statistical analysis was performed using Statistical Package for Social Sciences (SPSS).

RESULTS: One hundred and sixty-two (162) students with a mean age of 22.44 years, Std 1.661 and a range of 8 (19-27) were included in the study. Of the total number, 111 (68.51%) were males and remaining 51 (31.48%) were females. Of the total sample, only 1 (0.617%) student had diabetes mellitus, and 6 (3.70%) students gave a history of previous ocular surgery. Myopia was found to be the commonest error of refraction 53.7% with hyperopia next to it.

CONCLUSION: Myopia is found to be a common error of refraction in young adults. A regular checkup is essential to timely correct the error and to prevent deterioration of the vision.

Introduction

Eyes have been defined as the 'windows of the soul'. The International Agency for the Prevention of Blindness and World Health Organization have been declared this by starting the global initiative known as 'VISION 2020' for reducing of preventable blindness [1] [2]. Errors of refraction particularly myopia, have now become common and are continuously on rising globally [2]. Poor vision is a major limitation for a sound and enlightening supporting school/college condition for understudies in various areas of the world. Visual impedance because

of uncorrected refractive errors is exceptionally common among youthful grown-ups and is the second most common reason behind treatable visual hindrance [4]. The world's driving and most easily cured solution for poor vision among youthful grown-ups are refractive errors [5]. Pascolini D, [6] mentioned that visual weakness is a noteworthy medical issue and 80% of the reasons for this infirmity are viably preventable. Refractive errors now are turning into a huge issue in numerous countries globally. The incidence rate of myopia is beginning to increment particularly in Asian nations achieving pestilence levels [7]. Bourne RR et al., [8] claim uncorrected errors of refraction to be among the most

common causes of visual disability all over the world. Refractive errors can be a weight on nations' economy particularly the developing ones. In any case, it can be remedied by utilising a contact lens or power glasses. Many investigations have demonstrated a solid connection between the level of intelligence with years of school participation and the seriousness of myopia [9] [10] [11] [12]. A larger population is seemingly unaware of the problem, and this leads to a progressive visual inadequacy which seriously affects their potential. This applies very clearly to the young adults who are studying in their schools, colleges, and universities and suffer because of poor vision due to common errors of refraction [4] [5] [6] [7] [8] [9] [10] [11] [12].

Therefore, the present study was designed to study the prevalence of various errors of refraction among the medical students studying at the college of medicine, Qassim University, Saudi Arabia. The data collected from this study help to increase the awareness of refractive errors and to enhance vision associated promotions to reduce the refractive errors not only among medical students but also students from other colleges.

Methods

It's a cross-sectional study conducted over two months in a sample of 162 students from the college of medicine, Qassim University, KSA. The induction of the study population was by random selection from different academic years. The selected study population was explained the objectives of the study and a written consent form that stated the purpose, methods, risks, benefits, and the assurance of the confidentiality of the data was obtained from each student. After obtaining consent from the participants, each participant was examined by an auto refractometer (Auto Refractometer ARK-510A, NIDEK, Aichi, Japan) as described previously [13] [14]. Briefly, three measurements were taken of each participant's refractive status for their both eye with an auto refractometer. Refractive error measurements were recorded in sphere, negative cylinder, and cylinder axis format.

The readings were recorded on a data sheet of every individual, and the Statistical analysis was performed using Statistical Package for Social Sciences (SPSS). Also, a detailed history was taken about co-morbidities and history of previous surgery for the correction of the errors if any. All calculations of refractive error status were based on the non-cycloplegic auto refractometer readings. Spherical equivalent (SE) was calculated as sphere plus half cylinder. Myopia was defined as SE of at least -0.75 diopters (D) in either eye. Myopes were divided into three refractive error sub-groups based on their

refractions (SE): low myopia (SE between -0.75 and -2.99 D), moderate myopia (SE between -3.00 and -5.99 D), and high myopia (SE equal to or more myopia than -6.00 D). Hyperopia was defined as SE+1.00 D or positive and emmetropia as a spherical equivalent value between SE -0.75 D and SE+1.00 D in either eye. Astigmatism was defined as -1 Cylinder or more.

Results

This study comprises exclusively 162 students from different academic years of college of medicine, Qassim University. Among them, 111 (68.5%) were males, and the rest 51 (31.5%) were females. Only 2.65% students had diabetes mellitus, and 3.7% were reported to have previous ocular surgery. The demographic details of all studied subjects are given in Table 1.

Table 1: Demographics details of studied subjects

Subjects	Data
Age, years	22.4 ± 1.661
Mean ± SD; (range)	(19–27)
Gender:	
Males	111 (68.5%)
Females	51 (31.5%)
Co-Morbidities:	
Diabetes Mellitus	01 (2.65%)
Previous ocular surgery	06(3.70%)

In this study, we have taken all five academic year medical students and the breakups of students selected from each academic year are summarised in Table 2.

Table 2: Academic year of MBBS students

Academic Year	Number	Percentage(%)
First year	31	19.35
Second year	40	24.69
Third year	36	22.22
Fourth year	25	15.43
Fifth year	30	18.51
Total	162	

Various errors of refractions detected in the study population regarding their frequency are shown in Table 3.

Table 3: Frequency of errors of refraction

Error	Frequency	Percentage (%)
Myopia	87	53.7
Hyperopia	06	3.7
Astigmatism	02	1.2
Emmetropia	67	41.3
Total	162	

The most successive error of refraction was observed to be nearsightedness which was found in 87 (53.7%) examine subjects in our sample followed by Hypermetropia in 6 (3.7%) and Astigmatism in residual 2 (1.2%) subjects. The remaining 67 (41.3%) study subjects were emmetropes. We further

characterised myopic participants into three different categories based upon the severity of myopia. Our results show that mild myopic condition was the highest among all the myopic participants with the frequency of 58 (66.7%), followed by the moderate myopic conditions, which was found with the frequency of 22 (25.3%). However, the severe myopic condition was found in only 7 myopic participants with the percentage of 8.0%. The results of all studied 87 myopic patients are summarised in Table 4.

Table 4: Degree of the myopic condition in among the medical students

Degree of myopia	Frequency	Percentage (%)
Mild Myopia (SE between -0.75 and -2.99D)	58	66.66
Moderate Myopia (SE between -3.00 and -5.99D)	22	25.28
Severe Myopia (SE equal or more than -6.00D)	07	8.04
Total	87	

Discussion

Refractive errors can be perceived through normal examination of patients who present to ophthalmologic centres, or through vision screening of the majority allowed to move around voluntarily. The previous approach may work exquisitely in developed nations with wellbeing cognizant individuals. Vision screening programs are a vital necessity in underprivileged communities all around the world. Vision screening is generally normally done on schoolchildren, which is a valuable methodology for perceiving potentially treatable visual assortments from the standard, incorporating visual need in light of refractive goof and related amblyopia.

Ghaderi et al., [9]. Also mention in their study about rising incidence of errors of refraction in younger age children. It is now well reported that myopia is the most common error of refraction worldwide and it continues on the rise, and now it becomes a major social and economic burden of the affected individuals globally [15].

The prevalence of myopia in the United States appears to be significantly increased in 1999-2004 as compared with 30 years before, whereas Indian population was reported to have myopic condition approximately 20% [16] [17]. As far as the incidences of myopia in the specific cities are a concern, the reports from the cities like Singapore, Hong Kong Taiwan, etc. showed myopia is more common and on the rise [18]. Recently, Pan et al., [19] performed a meta-analysis on age-specific prevalence of myopia among Asian population and was found to be increasing with age [19].

This study was conducted on 162 medical students from all five academic years of Qassim University, Saudi Arabia and the data showed an increased incidence of errors of refraction among them. The majority of them were affected by myopia

followed by hyperopia, astigmatism and emmetropia. Our results are fully supported by the previous study conducted in Singapore medical students, which showed the occurrence rate of the myopic condition more than 82% as compared to the frequency of other errors of refraction [20]. Not only have these, but our study is also supported by another study conducted on medical students of Malaysia, where myopia was also found to be higher as compared with other errors of refraction [7].

Furthermore, our findings in medical students are also supported by another study performed among medical students of Norway, where myopia was again reported to be higher [21]. Interestingly, it is also important to the point that not only medical students are affected by myopia, but the reports showed that students at school levels were also affected by myopia [10] [11] [12], these findings further strengthen our results. An investigation of Sydney schoolchildren indicated ethnic contrasts in myopia prevalence; kids of East Asian ethnicity had a higher rate of myopia than European Caucasian kids [22].

Increasing levels of myopia increment the danger of vision hindrance and specifically, high nearsightedness is related to the danger of genuine and perpetual visual inability due to related sight-undermining problems. This study highlights the various degrees of myopia with high myopia being the most dangerous for vision as progression can have deleterious effects on visual acuity. Erdinest et al., [23] have recently proposed various treatment options for controlling the progression of myopia in the young population. Many other similar studies have postulated dangers of progressive myopia to cause various vision-threatening complications like retinal detachment, choroid atrophy, glaucoma etc. [24] [25] [26] [27] [28].

Another cross-sectional survey conducted in KSA included 21 primary schools with of 5176 children (mean age 9.5 ± 1.8 years) [29]. A study involved 504 medical students selected from hail university Saudi Arabia also show results in line with our study [30].

All these related studies have screened for myopia among younger children who may reduce the attribute ability of myopia occurrence. The various errors are correctable visual disorders that can cause blindness and there is a deep concern about the rising incidence of these problems all over the world.

In conclusion, the errors of refraction are the most common correctable causes of blindness all over the world. An action towards screening programs is suggested to pick the population affected to take timely measures to correct the error before it can lead to vision-threatening complications.

References

1. Khanna RC, Marmamula S, Rao GN. International Vision Care: Issues and Approaches. *Annu Rev Vis Sci.* 2017; 3:53-68. <https://doi.org/10.1146/annurev-vision-102016-061407> PMID:28937949
2. Gilbert C, Foster A. Childhood blindness in the context of VISION 2020--the right to sight. *Bull World Health Organ.* 2001; 79(3):227-32. PMID:11285667 PMCid:PMC2566382
3. Irving EL, Machan CM, Lam S, Hrynychak PK, Lillakas L. Refractive error magnitude and variability: Relation to age. *J Optom.* 2018; 2018.
4. Alam H, Siddiqui MI, Jafri SI, Khan AS, Ahmed SI, Jafar M. Prevalence of refractive error in school children of Karachi. *J Pak Med Assoc.* 2008; 58:322-5. PMID:18988392
5. Gilbert C. Changing challenges in the control of blindness in children. *Eye.* 2007; 21:1338-43. <https://doi.org/10.1038/sj.eye.6702841> PMID:17914437
6. Pascolini D, Mariotti SP. Global estimates of visual impairment: 2010. *Br J Ophthalmol.* 2012; 96(5):614-8. <https://doi.org/10.1136/bjophthalmol-2011-300539> PMID:22133988
7. Gopalakrishnan S, Prakash MVS, Jha K, Ranjit . A Study of Refractive Errors among Medical students in AIMST University, Malaysia 2011. *Indian Medical Journal.* 105. 365-367.
8. Bourne RR, Stevens GA, White RA, Smith JL, Flaxman SR, Price H, Jonas JB, Keeffe J et al. Causes of vision loss worldwide, 1990-2010: a systematic analysis. *Lancet Glob Health.* 2013; 1(6):e339-49. [https://doi.org/10.1016/S2214-109X\(13\)70113-X](https://doi.org/10.1016/S2214-109X(13)70113-X)
9. Ghaderi S, Hashemi H, Jafarzadehpour E, Yekta A, Ostadimoghaddam H, Mirzajani A, Khabazkhoob M. The prevalence and causes of visual impairment in seven-year-old children. *Clin Exp Optom.* 2017; 2017.
10. Paudel P, Ramson P, Naduvilath T, Wilson D, Phuong HT, Ho SM, Giap NV. Prevalence of vision impairment and refractive error in school children in Ba Ria - Vung Tau province, Vietnam. *Clin Exp Ophthalmol.* 2014; 42(3):217-26. <https://doi.org/10.1111/ceo.12273> PMID:24299145 PMCid:PMC4291105
11. Goh PP, Abqariyah Y, Pokharel GP, Ellwein LB. Refractive error and visual impairment in school-age children in Gombak District, Malaysia. *Ophthalmology.* 2005; 112(4):678-85. <https://doi.org/10.1016/j.ophtha.2004.10.048> PMID:15808262
12. Dandona R, Dandona L, Srinivas M, Sahare P, Narsaiah S, Mu-oz SR, Pokharel GP, Ellwein LB. Refractive error in children in a rural population in India. *Invest Ophthalmol Vis Sci.* 2002; 43(3):615-22. PMID:11867575
13. Oyo-Szerenyi KD, Wienecke L, Businger U, Schipper I. Autorefraction/autokeratometry and subjective refraction in untreated and photorefractive keratectomy-treated eyes. *Arch Ophthalmol.* 1997; 115:157-64. <https://doi.org/10.1001/archophth.1997.01100150159002> PMID:9046248
14. Xiong S, Lv M, Zou H, Zhu J, Lu L, Zhang B, Deng J, Yao C, He X, Xu X. Comparison of refractive measures of three autorefractors in children and adolescents. *Optom Vis Sci.* 2017; 94(9):894-902. <https://doi.org/10.1097/OPX.0000000000001113> PMID:28816868 PMCid:PMC5571878
15. Lou L, Yao C, Jin Y, Perez V, Ye J. Global Patterns in Health Burden of Uncorrected Refractive Error. *Invest Ophthalmol Vis Sci.* 2016; 57(14):6271-6277. <https://doi.org/10.1167/iovs.16-20242> PMID:27893092
16. Vitale S, Sperduto RD, Ferris FL. Increased prevalence of myopia in the United States between 1971-1972 and 1999-2004. *Arch Ophthalmol.* 2009; 127(12):1632-9. <https://doi.org/10.1001/archophthalmol.2009.303> PMID:20008719
17. Dandona R, Dandona L, Naduvilath TJ, Srinivas M, McCarty CA, Rao GN. Refractive errors in an urban population in Southern India: The Andhra Pradesh Eye Disease Study. *Invest Ophthalmol Vis Sci.* 1999; 40:2810-8. PMID:10549640
18. Saw SM, Chan YH, Wong WL, Shankar A, Sandar M, Aung T, Tan DT, Mitchell P, Wong TY. Prevalence and risk factors for refractive errors in the Singapore Malay Eye Survey. *Ophthalmology.* 2008; 115(10):1713-9. <https://doi.org/10.1016/j.ophtha.2008.03.016> PMID:18486221
19. Pan CW, Dirani M, Cheng CY, Wong TY, Saw SM. The age-specific prevalence of myopia in Asia: a meta-analysis. *Optom Vis Sci.* 2015; 92(3):258-66. <https://doi.org/10.1097/OPX.0000000000000516> PMID:25611765
20. Chow YC, Dhillon B, Chew PTK, Chew SJ. Refractive errors in Singapore dental students. *Singapore Med J.* 1990; 31:472-3. PMID:2259947
21. Midelfart A, Aamo B, Sjøhaug KA, Dysthe BE. Myopia among medical students in Norway. *Acta Ophthalmol.* 1992; 70:317-22. <https://doi.org/10.1111/j.1755-3768.1992.tb08571.x>
22. French AN, Morgan IG, Mitchell P, Rose KA. Risk factors for incident myopia in Australian schoolchildren: the Sydney adolescent vascular and eye study. *Ophthalmology.* 2013; 120:2100-8. <https://doi.org/10.1016/j.ophtha.2013.02.035> PMID:23672971
23. Erdinest N, Morad Y. Treatments for slowing the progression of myopia. *Harefuah.* 2017; 156(11):720-724. PMID:29198091
24. Walline JJ, Lindsley K, Vedula SS, Cotter SA, Mutti DO, Twelker JD. Interventions to slow progression of myopia in children. *Cochrane Database Syst Rev.* 2011; 7:(12):CD004916. <https://doi.org/10.1002/14651858.CD004916.pub3>
25. Walline JJ. Myopia Control: A Review. *Eye Contact Lens.* 2016; 42(1):3-8. <https://doi.org/10.1097/ICL.0000000000000207> PMID:26513719
26. Saw SM, Shih-Yen EC, Koh A, Tan D. Interventions to retard myopia progression in children: an evidence-based update. *Ophthalmology.* 2002; 109(3):415-21. [https://doi.org/10.1016/S0161-6420\(01\)00972-1](https://doi.org/10.1016/S0161-6420(01)00972-1)
27. Hasebe S1, Nonaka F, Nakatsuka C, Ohtsuki H. Myopia control trial with progressive addition lenses in Japanese schoolchildren: baseline measures of refraction, accommodation, and heterophoria. *Jpn J Ophthalmol.* 2005; 49(1):23-30. <https://doi.org/10.1007/s10384-004-0131-6> PMID:15692770
28. Gwiazda JE, Hyman L, Norton TT, Hussein ME, Marsh-Tootle W, Manny R, Wang Y, Everett D; COMET Group. Accommodation and related risk factors associated with myopia progression and their interaction with treatment in COMET children. *Invest Ophthalmol Vis Sci.* 2004; 45(7):2143-51. <https://doi.org/10.1167/iovs.03-1306>
29. Aldebasi YH. Prevalence of correctable visual impairment in primary school children in Qassim Province, Saudi Arabia. *J Optom.* 2014; 7(3):168-176. <https://doi.org/10.1016/j.optom.2014.02.001> PMID:25000873 PMCid:PMC4087181
30. Al-Rowaily MA. Prevalence of refractive errors among pre-school children at King Abdulaziz Medical City, Riyadh, Saudi Arabia. *Saudi J Ophthalmol.* 2010; 24(2):45-8. <https://doi.org/10.1016/j.sjopt.2010.01.001> PMID:23960874 PMCid:PMC3729549