

Prevalence of Refractive Errors among Students of Faculty of Medicine, Herat University, Afghanistan

**Sayed Farooq Hosaini¹, Abdul Subhan Seddiqi^{2*}, Mohammad Naser Nabizada³,
Khairullah Karimi⁴**

¹*Department of Surgery, Faculty of Medicine, Herat University, Herat, Afghanistan*

²*Department of Public Health and Infectious Disease, Faculty of Medicine, Herat
University, Herat, Afghanistan*

³*Department of Surgery, Faculty of Medicine, Herat University, Herat, Afghanistan*

⁴*Department of Optometry, Faculty of Medicine, Herat University, Herat,
Afghanistan*

Abstract

One of the major health problems in the world, especially in developing countries, is impaired vision in different age groups. According to the World Health Organization, about 253 million people worldwide suffer from visual impairment, including 217 million people with moderate to severe visual impairment. Uncorrected refractive error is the major cause of visual impairment (53%) and the second leading cause of blindness worldwide. About a quarter of the world's literate and educated population have a refractive error.

To determine the prevalence of visual impairment among medical students of Herat University. This descriptive cross-sectional study was carried out from September 6, 2019 until October 5, 2019 among medical students of the Herat University. After conducting optometric examinations and determining visual acuity among students, an interview-based pre-defined questionnaire was completed for each student.

In this study, 497 students participated, 226 students (45.5%) had refractive error, including 101 cases (20.5%) with myopia, twenty-one cases (4.2%) with hyperopia, and 100 cases (20.1%) with astigmatism. In addition, three students (0.6%) had both myopia and astigmatism.

The prevalence of myopia and astigmatism is high among medical students of the Herat University. Regular visual check-up is necessary to correct the refractive errors and to prevent the progression of visual impairment.

Keywords: Medical Students, Myopia, Refractive error, Visual Impairment

Introduction

All human senses, vision is the most important, the most used, and therefore the most affected. About three-quarters of personal information is obtained through the sense of vision. Healthy and normal vision is one of the most important human needs in all aspects of life (Adigun et al., 2014). Uncorrected refractive error is the most common cause of vision loss and the second leading cause of blindness in the world (Shi et al., 2018). Refractive error is an error in focusing light rays on the retina. The major types of refractive errors include myopia (nearsightedness), hyperopia (farsightedness), and astigmatism (Al-Rashidi et al., 2018).

A high prevalence of refractive errors has been reported in medical students, the most common of which is myopia (Alruwaili et al., 2018; Karki et al., 2018; T. Jyothirmal et al., 2017; Wang et al., 2017). About a quarter of the world's educated population has the refractive error (Basu et al., 2016). Refractive error is associated with near-work activities such as reading, writing, computer use, and mobile phones. Excessive curriculum in medical universities has led to an excessive student near activities, leading to the development of myopia (A. Salih, 2018; Alsaif et al., 2019; Basu et al., 2016).

The prevalence of refractive errors varies by gender in different studies. In China and Greece, for example, the prevalence of refractive errors, including myopia, was higher in female students than in males. While in Baruda and Burdwan, its prevalence was slightly higher in men than in women. In Calcutta, Norway, Singapore and Turkey there was no significant difference in the prevalence of refractive errors between women and men (Basu et al., 2016; Wei et al., 2018).

Uncorrected refractive error among university students has immediate and long-term detrimental effects, including loss of employment and educational opportunities, loss of economic income, and reduced quality of life (Basu et al., 2016). Resting after an hour of study, not studying under dim lamps, reading during the day instead of studying at night, limiting the time of using the computer and mobile phone, performing eye exercises and getting enough sleep may reduce eye strains and the incidence of refractive errors (Wang et al., 2017). This study aimed to assess the incidence of refractive errors among medical students at Herat University.

Material and methods

Study design, duration, and place

This descriptive cross-sectional study was conducted for one month (September 6th to October 5th, 2019), in the Department of Public Health and Infectious Diseases of the Faculty of Medicine, Herat University.

Population size and sampling strategy

A total of 1292 students had been studying at the Faculty of Medicine, Herat University in 2019. The sample size of 382 students was calculated with a margin of error of 5%, a confidence level of 98%, and a response distribution of 50%. An additional 30% was added to the calculated

Prevalence of Refractive Errors among Students of Faculty of Medicine, Herat University,
Afghanistan

sample size to accommodate for errors. A simple random sampling technique was used to select participants from the university attendance sheet.

Data collection

Each student was examined individually using the standard Snellen Chart. The presence or absence of refractive error was assessed objectively using an autorefractometer (Topcon RM 8000, Tokyo, Japan). Subjective visual acuity and refractive error were assessed using a trial frame and lens sets.

In addition, a 31-item interview-based questionnaire was used to collect data from each participant. This questionnaire included questions about participants' age, sex, year of study, family history, history of refractive errors, wearing, and duration of wearing glasses.

Statistical analysis

Data were analyzed using IBMSPSS Statistics (version 21). Categorical variables are presented as numbers and percentages. Chi-square test is used to compare results between different groups. A $p < 0.05$ was considered statistically significant.

Ethics

The protocol of this study was approved by the human ethics committee of Herat University. All participants signed informed consent before the commencement of the examination.

Results

A total of 497 students were included in this study, of which 275 (55.3%) were male and 222 (44.7%) were female. 186 students (36.2%) were between 17-20 years old, 249 students (50.2%) were between 21-24 years old and sixty-eight students (13.6%) were between 25-27 years old.

In this study, 497 students included, 107 students (21.5%) were in the first year, fifty-three students (10.7%) were in the second year, seventy-two students (14.5%) were in the third year, sixty-one students (12.3%) were in the fourth year, seventy-one students (14.3%) were in the fifth year, 123 students (24.7%) were in the sixth year and ten students (2%) were in the seventh year. 375 students (75.5%) were single and 122 students (24.5%) were married. Of the 497 students included in this study, 271 students (54.5%) had no refractive error and 226 students (45.5%) had at least one type of refractive error. Myopia was the most common refractive error (20.5%), while myopic astigmatism was the least common (0.6%). Of the 226 participants with refractive errors, 146 (64.6%) were aware of their refractive error, of which only forty-five were wearing glasses at the time of examination (Figure 1).

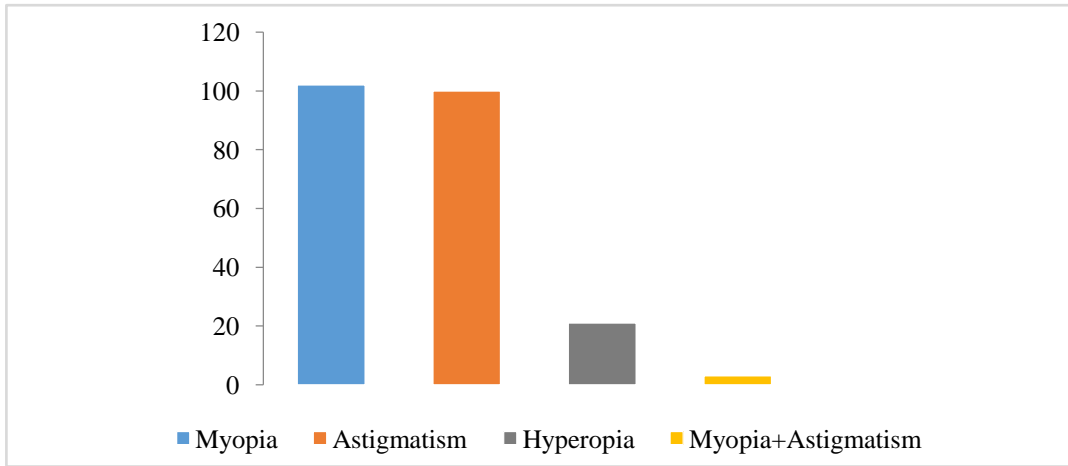


Figure 1. Prevalence of refractive errors among medical students of Herat University

All participants, who had refractive errors or visual impairment, only 105 students were wearing glasses. Others did not wear glasses for different reasons. The most common reasons for not wearing glasses in this study included: economic constraint (thirty-seven students), unwillingness of the family (twenty-two students), unwillingness of student (fifteen students), inappropriate treatment of the community (thirteen students), headache (ten students), and cosmetic (eight students).

Of the 497 under study students, 345 (69.4%) had a normal vision of 6/6; the remaining 152 participants (30.6%) had different degrees of visual impairment (Figure 2).

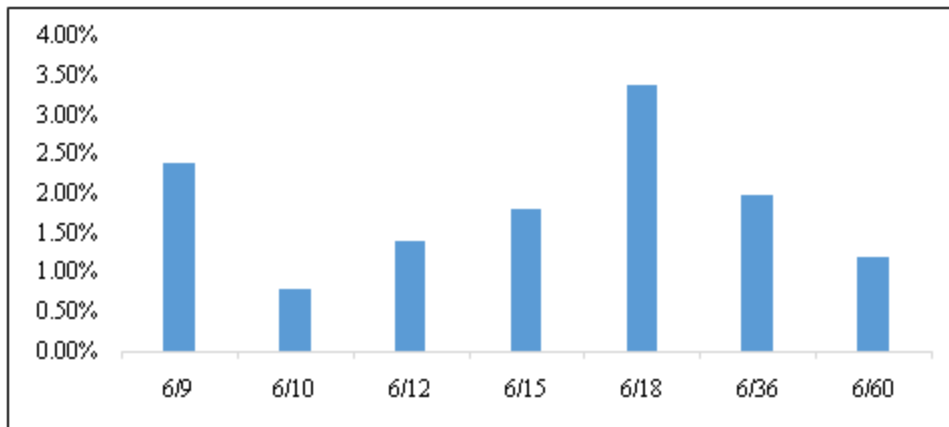


Figure 2. The visions of the participants of the study

Prevalence of Refractive Errors among Students of Faculty of Medicine, Herat University, Afghanistan

In this study, 263 students (52.9%) had no family history of refractive error, while 234 students (47.1%) indicated a family history of refractive error(Figure 3).

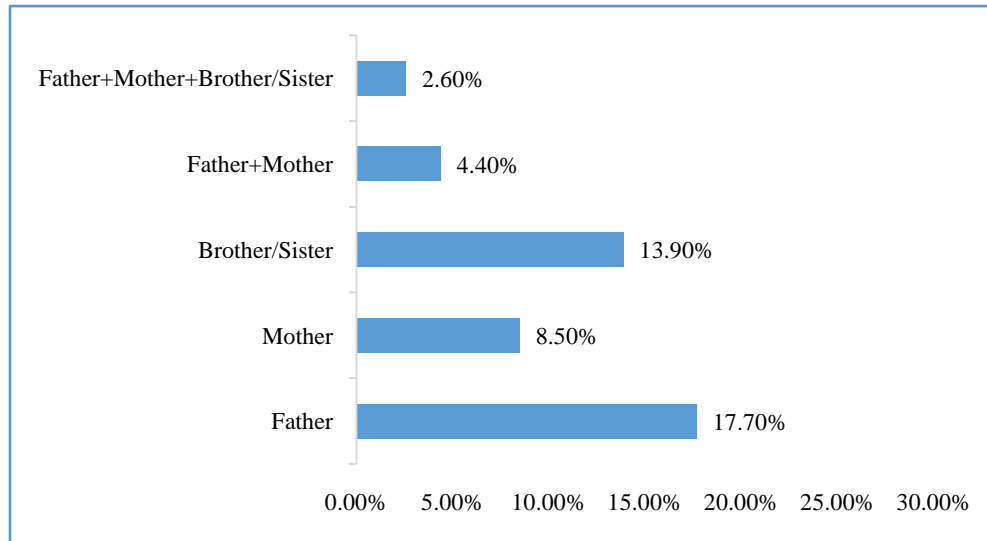


Figure 3. Family history of refractive errors among medical students of Herat University

According to gender, of the 275 male participants of this study, 156 students (56.7%) had no refractive errors. While, of the 222 female participants, 115 (51.8%) had no refractive errors. Table 1 displays the frequency of different types of refractive errors among male and female participants of this study. Table 2 displays the frequency of visual impairment in different age categories. As noted in this table, in all categories, more than half participants had normal vision. The most frequent refractive error was myopia and least frequent refractive error was hyperopia (Table 2).

Table 1. Prevalence of different types of refractive errors according to gender. $P = 0.612$

Vision categories	Male / n (%)	Female / n (%)	Total / n (%)
Normal	156 (56.7)	115 (51.8)	271 (54.5)
Myopia	58 (21.1)	47 (21.2)	105 (21.1)
Hyperopia	10 (3.6)	11 (5)	21 (4.2)
Astigmatism	51 (18.5)	49 (22.1)	100 (20.1)
Total	275 (55.3)	222 (44.7)	497 (100)

Table 2. Prevalence of different types of refractive errors according to age. $p = 0.384$

Vision categories	17-20 years / n (%)	21-24 years / n (%)	25-27 years / n (%)	Total / n (%)
Normal	101 (56.1)	130 (52.2)	40 (58.8)	271 (54.5)
Myopia	30 (16.7)	58 (23.3)	17 (25)	105 (21.1)
Hyperopia	7 (3.9)	12 (4.8)	2 (2.9)	21 (4.2)
Astigmatism	42 (23.3)	49 (19.7)	9 (13.2)	100 (20.1)
Total	180 (36.2)	249 (50.2)	40 (58.8)	497 (100)

Discussion

Nowadays, refractive errors are the most common cause of visual impairment worldwide. The prevalence of refractive error among medical students of Herat University in this study was 45.47%, which is relatively higher than the general population (36.5%) (T. Jyothirmal et al., 2017). The prevalence of refractive error in this study is higher than findings of studies from Nepal (21.4%), India (26.3%) and Iraq (33.0%) (A. Salih, 2018; Basu et al., 2016; Karki et al., 2018). However, the prevalence of refractive errors in this study is much lower than the results reported from East India (56.9%), Saudi Arabia (67.1% and 83.1%), and China (89.9%) (Alruwaili et al., 2018; W. S. Alruwaili et al., 2018; Dey et al., 2014; Shi et al., 2018). Differences in the prevalence of refractive errors among medical students in different countries may be attributed to racial differences, hereditary factors, environmental factors, different research methods and different refraction techniques.

This study found that myopia was the most common refractive error among medical students at Herat University. This is in accordance with results of studies conducted by Alsaif et al., (2019; 47.9%) and Alruwaili et al., (2018; 53.9%) (Alruwaili et al., 2018; Alsaif et al., 2019). We found that astigmatism was the second prevalent refractive error among medical students at Herat University. In a study by Dey et al. (2014), astigmatism accounted for 12.12% of refractive errors in East India, which is similar to the results of this study (Dey et al., 2014). However, the prevalence of astigmatism in India is reported to be 1.8% (Grag et al., 2018); which was the third common refractive error after myopia and hyperopia.

The results of this study showed that two-third of participants had normal vision. Only one-third of students who had visual impairment or refractive errors were using glasses; the remaining two-third were not wearing glasses due to their low economic status, family hesitancy, student reluctance and inappropriate treatment of the society. This result is in accordance with those of Dey et al. (2014), in which 31.25% of students used glasses to correct their refractive

errors (Dey et al., 2014). In a study among medical students in India, factors responsible for not wearing glasses include lack of awareness, lack of access to optometry services, low economic status, and cultural barriers (Basu et al., 2016).

Also, in our study, 43.3% of male students and 48.2% of female students had refractive error. Therefore, the prevalence of refractive errors was higher among female students than males, but the difference was not statistically significant ($p = 0.612$). This result is similar to the findings of studies conducted elsewhere, that no significant differences were noted between the prevalence of refractive errors between males and females (Basu et al., 2016; Wei et al., 2018). In this study, no significant differences were seen in the prevalence of all types of refractive errors in different age groups ($p = 0.384$).

Our findings indicate that almost half of participants who had refractive errors indicated that at least one of their family members also has a type of refractive error. Studies conducted in India and Iraq also reported that one-third of students participated in studies had a family history of refractive error (A.Salih, 2018; Basu et al., 2016).

Conclusion

Refractive error is very prevalent among students of Faculty of Medicine at Herat University, and the most prevalent type was myopia. There is no significant difference in the prevalence of refractive errors between male and female students and in different age groups. Only one-third of participants who had refractive errors or visual impairment, were wearing glasses. Regular visual check-up is necessary to correct the refractive error and to prevent the progression of visual impairment.

References

1. A.Salih, A. (2018). Prevalence and progression of refractive errors among EL-mustansiriyah medical students. *Eurasian Journal of Medicine and Oncology*, 2(2), 79-83. <https://doi.org/10.14744/ejmo.2017.99609>
2. Adigun, K., Oluleye, T. S., Ladipo, M. M., & Olowookere, S. A. (2014). Quality of life in patients with visual impairment in Ibadan: a clinical study in primary care. *J Multidiscip Healthc*, 7, 173-178. <https://doi.org/10.2147/jmdh.S51359>
3. Al-Rashidi, S. H., Albahouth, A. A., Althwini, W. A., Alsohibani, A. A., Alnughaymishi, A. A., Alsaeed, A. A., Al-Rashidi, F. H., & Almatrafi, S. (2018). Prevalence Refractive Errors among Medical Students of Qassim University, Saudi Arabia: Cross-Sectional Descriptive Study. *Open Access Maced J Med Sci*, 6(5), 940-943. <https://doi.org/10.3889/oamjms.2018.197>
4. Alruwaili, Amal Muhaysin, Turki Dkhallah Turki Alshamdin, & Maram Khalf Ayad Alenzi, D. F. M. A., Afnan Hamdan R Alshammari, Bashayer Khlaif Alruwaili. (2018). Refractive Errors among Northern Border University Medical Students. *The Egyptian*

Journal of Hospital Medicine, 72(1), 3692-3696.
https://ejhm.journals.ekb.eg/article/8187_eca25782fa619bf5b96a9d6aeb20f2e6.pdf

5. Alruwaili, W. S., Alruwaili, M. S., Alkuwaykibi, M. K., & Zaky, K. A. (2018). Prevalence and Awareness of Refractive Errors among Aljouf University Medical Students. *The Egyptian Journal of Hospital Medicine*, 70(1), 29-32. <https://doi.org/10.12816/0042958>
6. Alsaif, B. A., Aljindan, M. Y., Alrammah, H. M., Almulla, M. O., & Alshahrani, S. S. (2019). Refractive errors among Saudi college students and associated risk factors. *Clin Ophthalmol*, 13, 437-443. <https://doi.org/10.2147/ophth.S193213>
7. Basu, M., Ray, S., Mazumdar, M., & Chatterjee, A. K. G. P. S. S. (2016). Refractive Errors and its Determinants among Medical Students of Kolkata: A Descriptive Study. *International Journal of Preventive and Public Health Sciences* 2(1), 11-17.
8. Dey, A. K., Chaudhuri, S. K., Jana, S., Ganguly, P., Ghorai, S., & Sarkar, A. (2014). Prevalence of Refractive Errors in Medical Students. *International Journal of Health Sciences & Research*, 4(8), 98-102.
9. Karki, P., Sijapati, M., Basnet, P., & Basnet, A. (2018). Refractive Errors Among Medical Students. *Nepalese Medical Journal*, 1, 21-23. <https://doi.org/10.3126/nmj.v1i1.20394>
10. Shi, X. Y., Ke, Y. F., Jin, N., Zhang, H. M., Wei, R. H., & Li, X. R. (2018). The prevalence of vision impairment and refractive error in 3654 first year students at Tianjin Medical University. *Int J Ophthalmol*, 11(10), 1698-1703. <https://doi.org/10.18240/ijo.2018.10.19>
11. T. Jyothirmai, V., Meenakshi, S. V., & Padmavathi. (2017). A Study on Refractive Errors Among Medical Students Attending Ophthalmology Department. *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 16(10), 57-61.
12. Wang, L., Du, M., Yi, H., Duan, S., Guo, W., Qin, P., Hao, Z., & Sun, J. (2017). Prevalence of and Factors Associated with Myopia in Inner Mongolia Medical Students in China, a cross-sectional study. *BMC Ophthalmol*, 17(1), 52. <https://doi.org/10.1186/s12886-017-0446-y>
13. Wei, S., Sun, Y., Li, S., Hu, J., Yang, X., Lin, C., Cao, K., Du, J., Guo, J., Li, H., & Wang, N. (2018). Refractive Errors in University Students in Central China: The Anyang University Students Eye Study. *Invest Ophthalmol Vis Sci*, 59(11), 4691-4700. <https://doi.org/10.1167/iovs.18-24363>