

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

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## ABSTRACT

**Introduction:** One of the major health problems in the world, especially 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.

**Objective:** To determine the prevalence of visual impairment among medical students of Herat University.

**Materials and Methods:** This descriptive cross-sectional study was carried out for one month (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.

**Results:** Of the 497 students participating in the study, 226 students (45.5%) had refractive errors, including 101 cases (20.5%) with myopia, 21 cases (4.2%) with hyperopia, and 100 cases (20.1%) with astigmatism. In addition, three students (0.6%) had both myopia and astigmatism.

**Conclusion:** The prevalence of myopia and astigmatism is high among students of Faculty of Medicine, Herat University. Regular visual check-up is necessary to correct the refractive error and to prevent the progression of visual impairment.

**Keywords:** Visual Impairment, refractive error, myopia, medical Students.

## INTRODUCTION

Of 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., 2013). 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 error has been reported in medical students, the most common of which is myopia (Jyothirmal et al. 2017; Wang et al. 2017; Karki et al., 2018; Alanazi et al., 2018). About a quarter of the world's educated population has 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 excessive student near activities, leading to the development of myopia (Alsaif et al., 2019; Salih 2018; Basu et al., 2016).

The prevalence of refractive errors varied 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 and in Calcutta, Norway, Singapore and Turkey there was no significant difference in the prevalence of refractive errors between women and men (Basu et al., 2018; 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 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). The aim of this study was to assess the incidence of refractive error 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 6<sup>th</sup> to October 5<sup>th</sup>, 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. 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 sample size to accommodate for errors. A simple random sampling technique was used to select participants from university attendance sheet.

### Data collection

Each student was examined individually using 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 was 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 error, wearing glasses and duration of glass wear.

### Statistical analysis

Data was analyzed in IBM SPSS Statistics (version 21). Descriptive statistics are presented as means and standard deviation, quantitative variables are presented in the form of range (minimum and maximum), and categorical variables are presented as numbers and percentages. Independent samples T-test was 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 an informed consent before the commencement of the examination.

## Results

A total of 497 students included in this study, of which 275 (55.3%) were male and 222 (44.7%) were female. One hundred and eighty students (36.2%) were between 17-20 years old, 249 students (50.2%) were between 21-24 years old and 68 students (13.6%) were between 25-27 years old.

Of the 497 students included in this study, 107 students (21.5%) were in the first year, 53 students (10.7%) were in the second year, 72 students (14.5%) were in the third year, 61 students (12.3%) were in the fourth year, 71 students (14.3%) were in the fifth year, 123 students (24.7%) were in the sixth year and 10 students (2%) were in the seventh year. Three hundred and seventy-five 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 a type of refractive error. Myopia was the most common refractive error (20.5%), while myopic astigmatism was the least common (0.6%; Figure 1). Of the 226 participants with refractive errors, 146 (64.6%) were aware of their refractive error, of which only 45 were wearing glasses at the time of examination.

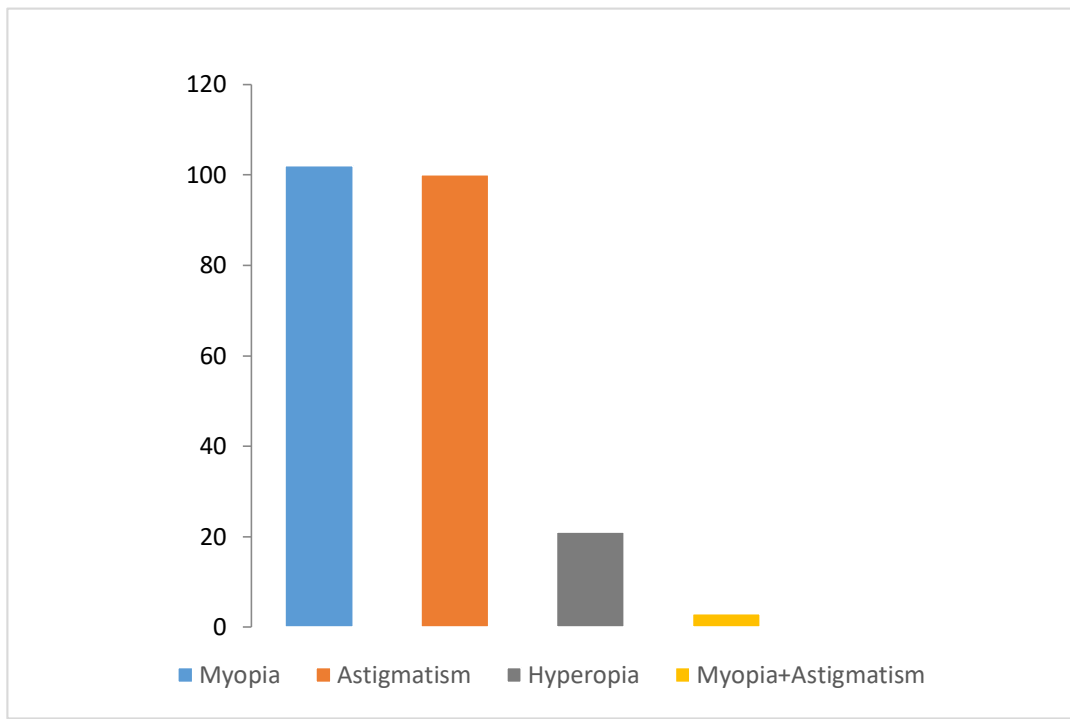


Figure 1. Prevalence of refractive errors in this study

Of all participants included in this study 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 (37 students), unwillingness of the family (22 students), unwillingness of student (15 students), inappropriate treatment of the community (13 students), headache (10 students), and cosmetic (8 students).

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

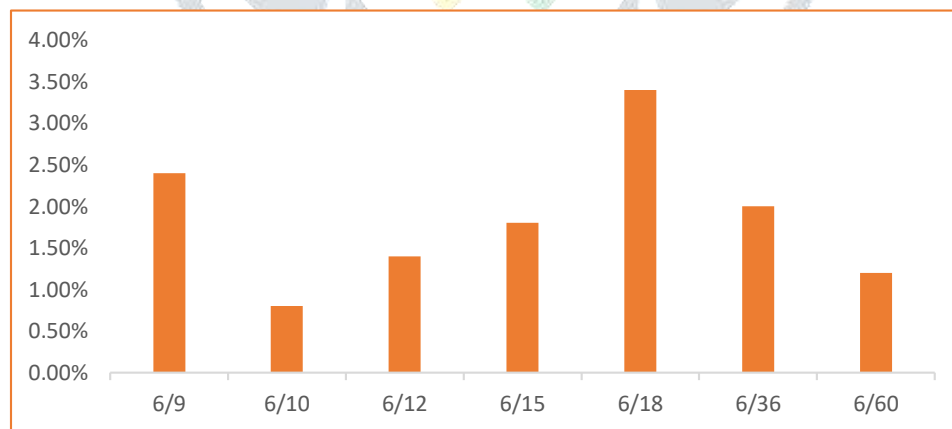


Figure 2: the vision of participants in this study

A total of 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 displays the percentage of students whose family members had a refractive error.

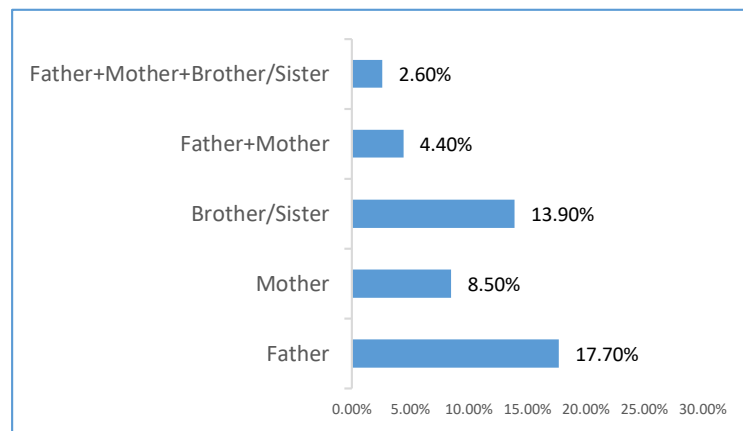


Figure 3: Family history of refractive error between students

According to gender, of the 275 male participants in this study, 156 students (56.7%) had no refractive errors.. In addition, 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 1. Prevalence of different types of refractive errors according to gender N (%) P = 0.612

Vision categories	Male	Female	Total
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)
Stigmatism	51 (18.5)	49 (22.1)	100 (20.1)
Total	275 (55.3)	222 (44.7)	497 (100)

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 is myopia and least frequent refractive error is hyperopia (Table 2).

Table 2. Prevalence of different types of refractive errors according to age n (%) p = 0.384

Vision categories	17-20 years	21-24 years	25-27 years total	total
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)
Stigmatism	42 (23.3)	49 (19.7)	9 (13.2)	100 (20.1)
Total	180 (36.2)	249 (50.2)	68 (13.6)	497 (100)

## Discussion

Today, 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%) (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%; Karki et al. 2018; Basu et al. 2016; Salih, 2018). However, the prevalence of refractive error 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%; Dey et al., 2014 ; Alanazi et al., 2018; Alruwaili et al., 2018; 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 Alanazi et al., (2018; 53.9%). 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 error in East India, which is similar to the results of this study. However, the prevalence of astigmatism in India 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 show 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. 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., 2018).

Also, in our study, 43.3% of male students and 48.2% of female students had refractive error. Therefore, the prevalence of refractive error 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, in which no significant differences were noted between the prevalence of refractive error between males and females (Basu et al., 2018; 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 those studies had a family history of refractive error (Basu et al., 2018, Salih, 2018).

## Conclusion

Refractive error is very prevalent among student of Faculty of Medicine at Herat University, and the most prevalent type was myopia. There is no significant difference in the prevalence of refractive error 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.

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