Prevalence Of Refractive Errors Among Medical Students In Benghazi University

Adel Ahmed El Obeidi [1] and Mohammad Hassan Ajram Mahmoud [2]

[1] Assistant Professor of Ophthalmology Department, MD, Faculty of Medicine, University of Benghazi, Libya.

The German specialist training in ophthalmology (Die Deutsche Facharztausbildung in Augenheilkunde)

Tel: 00218926214938   E-mail: alobaidiadel21@gmail.com

[2] MBBCH Faculty of Medicine, Benghazi University, Benghazi, Libya

Corresponding Author:

Muhammad Hassan Ajram Mahmoud

Tel. : 218 92-1235197   E-Mail: Ajram7edj@gmail.com

Abstract – Background: Refractive errors (REs) are common and continue to increase globally. Uncorrected REs are the second leading cause of preventable blindness and the most common cause of visual impairment. Aim of the study: The objective of the study was to determine the prevalence of refractive errors and its association with age, gender among the students of Medical Sciences colleges in Benghazi university, Libya. Patients & Methods: This cross sectional study was performed in the department of ophthalmology, Benghazi university during the period from December 2023 to March 2024 (4 months). The target population of the study was 200 students aged 19-25 years, of Medical Sciences colleges in Benghazi university. The selected students were invited to participate in the study, students already had pre-existing ocular causes of decreased visual acuity and so were not eligible for the study were excluded from the study Results: the age was 23.3. ± 1.02 years, patients were 116 (58%) females and 84 (42%) females. The overall prevalence rate of myopia was 58.75%, hypermetropia was 2.5% and astigmatism was 37.75%. myopia was recoded in 20 males versus 27 females, hypermetropia was recorded in one male versus one female, while Astigmatism was recorded in 16 males versus 15 females. refractive errors were more in the age group (23-25 years). Conclusion: Prevalence rates of myopia in medical students are found to be quite high myopia is the predominant refractive error among the medical students and correction of refractive error could benefit the society and nation at large.

Keywords – Astigmatism; hypermetropia; Myopia; Refractive errors.

I. INTRODUCTION

The refractive status of the eye is an expression used to denote the relationship between the refractive mechanism (dioptrics) of the eye and the spatial location of the sensory layer of the eye (retina). This is broadly classified into two groups; emmetropia and ametropia. The latter term is employed to describe the clinical condition in which there is a variation from a perfect coincidence of the posterior principal focus of an eye's refractive media and the retina, while the former denotes the clinical condition in which the perfect coincidence exists. A further classification of the latter condition is made based upon the location of this posterior principal focus thus formed relative to the position of the retina [1].

Refractive errors (REs) are defined as a condition, in which the optics of the nonaccommodating eye are unable to take parallel light rays to concentrate on the retina. REs can present singularly such as myopia (nearsightedness), hyperopia (farsightedness), and astigmatism, or combined, such as myopic astigmatism and hyperopic astigmatism [2].

Myopia is considered as one of the most frequent refractive error which is defined as a refractive error spherical caused by extreme refractive power relative to corneal curvature and thickness lens and / or increased anteroposterior diameter of the eyeball, causing a light refraction to a focal point in front of the retina [3].

Students had a higher prevalence of myopia in comparison with others. The exposure and use of the computer with study for long times are associated with the development and progression of myopia [4]. Medical students showed higher risk relative to other students as a consequence of spending a lot of hours reading, doing vision work nearby and using electronic devices. Thus, medical students consider themselves population with a high predisposition to myopia [5].

II. AIM OF THE STUDY

The objective of the study was to determine the prevalence of refractive errors and its association with age, gender among the students of Medical Sciences colleges in Benghazi university, Libya.

III. PATIENTS AND METHODS

This cross sectional study was performed in the department of ophthalmology, Benghazi university during the period from December 2023 to March 2024 (4 months). The target population of the study was 200 students aged 19-25 years, of Medical Sciences colleges in Benghazi University. The selected students were invited to participate in the study.

Written informed consent was obtained from all patients and the study was approved by the research ethical committee of Faculty of Medicine, Benghazi University (Institutional review board).

We randomly selected medical students for this study. A total 200 students were included in this study. Students who were using spectacle, contact lens or had a history surgical intervention like LASIK, were taken as having refractive errors and others were evaluated for refractive errors.

Students already had pre-existing ocular causes of decreased visual acuity and so were not eligible for the study were excluded from the study.

In the first step, the participants answered a number of demographic questions in an interview and then, the examinations were performed.

All students were assessed for refractive errors using auto-refractometer (Topcon RM-8000B, Topcon Corporation, Tokyo, Japan).

Refraction data were recorded as follows: An initial objective refraction result was recorded as the average of sex reading for each eye, then, subjective refraction was attempted to refine vision, using the results of the objective refraction as a starting point.

Also, a detailed history was taken about co-morbidities and history of previous surgery for the correction of the errors if any.

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.

Sample Size

The sample size for this study is calculated to be 460 students. The estimation was based on the sample size formula for cross-sectional study designs, using the following parameters: prevalence of RE = 50% (as no previous study on RE was conducted at Benghazi University), a 95% confidence interval (CI), and an error of not more than 5%. Furthermore, the study assumed a nonresponse rate of 15%.

Statistical analysis

The readings were recorded on a data sheet of every individual and all data were collected, tabulated and statistically analyzed using SPSS 26.0 for windows (SPSS Inc., Chicago, IL, USA). Quantitative data were expressed as the mean ± SD & range , and qualitative data were expressed as absolute frequencies (number) & relative frequencies (percentage). t (student 't) test was used to compare between   two groups of normally distributed variables. Percent of categorical variables were compared using Chi-square test. All tests were two sided. p-value < 0.05 was considered statistically significant   p-value ≥ 0.05 was considered statistically insignificant .

IV. RESULTS

Table 1: Demographic data distribution of the subjects.

Variables	Number (n = 200)	Percentage%
Gender		
Female	116	58
Male	84	42
Age		
Mean ± SD	23.3 ± 1.02	
Range	18-25	
Co-Morbidities		
Diabetes Mellitus	3	1.5
Previous ocular surgery	12	6
Previous ocular surgery	78	39
No Previous ocular surgery	122	61

This table showed that a total of 200 peoples age was 23.3. ± 1.02 years, they were 116 (58%) females and 84 (42%) females were selected in this study. Regarding Co-Morbidities, there were 3 (1.5%) had Diabetes Mellitus and 12 (6%) underwent previous ocular surgery.

Table 2: Prevalence of refractive errors according to gender

Variables	Males	Females	Percentage%
Without refractive errors	50 (25%)	70 (35 %)	120 (60%)
With refractive errors	34 (17%)	46 (23 %)	80 (40%)
Total	84 (42 %)	116 (58%)	100

This table showed that 80 subjects were with refractive errors, they were 34 males (17%) and 46 females (23%)

Table 3: clinical data of myopia among studied patients

Relevant Data	No	%
ffected with refractive errors		
Bilateral	26	32.5
Left	18	22.5
Right	36	45
/earing vision aids		
Glasses	62	77.5
Lenses	18	22.5

   Myopia was bilateral among 26 cases (32.5%), of the affected students while on left eye among 18 cases (22.5%) and right eye among 18 cases of affected students. (22.5%). Exact of 62 cases (77.5%) wear glasses and 18 (22.5%) wear lenses.

Table 4: clinical data of myopia among studied patients (n = 80)

refractive errors type	Prevalence	
	No	%
myopia	**47**	**58.75**
hypermetropia	2	2.5
Astigmatism	31	37.75
Total	80	100

The overall prevalence rate of myopia was 58.75%. The prevalence rate of hypermetropia was 2.5% and astigmatism was 37.75%.

Table 5: Different types of refractive errors according to gender (n = 80)

refractive errors type	Males		Females		Total	
	No	%	No	%	No	%
yopia	20	25	27	33.75	47	58.75
ypermetropia	1	1.25	1	1.25	2	2.5
stigmatism	16	20	15	18.75	31	37.75
otal	37	46.25	43	53.75	80	100

This table display the various types of refractive errors between studied cases according to gender, **myopia was recoded** in 20 males versus 27 females, hypermetropia was recorded in one male versus one female, while Astigmatism was recorded in 16 males versus 15 females.

Table 6: Pattern of refractive errors according age group

	Myopia (n= 47, %)	ypermetropia (n= 2, %)	Astigmatism (n= 31, %)	P
ge groups (years)				
18-20	10 (21.3)	0 (0)	4 (12.9)	0.184
20-23	17 (36.2)	0 (00)	10 (32.3)	
23-25	20 (42.5)	2 (100)	17 (54.8)	

This table showed that **refractive errors** were more presented in the age group (23-25 years) which means that the increase of refractive errors related to old age.

V. DISCUSSION

Refractive errors (REs) are among the leading causes of vision loss worldwide. Therefore, it has been the concern of numerous researches worldwide to determine the patterns of its prevalence among different populations and to determine the risk factors impacting its prevalence [6].

The overall occurrence of refractive errors in our study was recorded in 80 subjects (40%) were with refractive errors, they were 34 males (17%) and 46 females (23%), which in agreement with the study of **Abuallut et al.,** [2] who concluded that the occurrence of refractive errors in their tudy was 56.9%, myopia in 208(63.03%) was the commonest type of refractive error followed by Hypermetropia and Astigmatism. Also the current results similar to the studies on medical students in Pakistan (58%) [7], in Copenhagen (50.3%) [8].

The prevalence revealed by the present study was lower than those previously reported in some districts of Saudi Arabia (Aljouf University medical students) [9]. However, it was higher than the prevalence recorded in other parts of India [10]. It was also higher than the prevalence observed in Iraq [11].

The present study showed that myopia being the most common type in 47 cases (58.75%), in the same line **Al–Rashidi et al.,** [12] found that myopia was the most common type in 87 cases (53.7%) of affected students.

Dey et al., [13] found that myopia, 208(63.03%) was the commonest type of refractive error followed by Hypermetropia and Astigmatism. Association of refractive errors with age and sex was studied and it was more common in 18-23 years of age

while **Abuallut et al.,** [2] showed myopia was the most common type of REs, affecting one-third (33.8%) of the students compared to hyperopia and astigmatism. While other studies conducted in the KSA agreed that myopia was the most common type of REs among students, they reported a higher prevalence of myopia than our study.

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 [12].

The current study showed that myopia was bilateral among 26 cases (32.5%), of the affected students while on left eye among 18 cases (22.5%) and right eye among 18 cases (22.5%), **Alamri et al.,** [5] found that Myopia was bilateral among 84 56.4% of the affected students while on left eye among 37 24.8%.

The current study showed that the various types of refractive errors between studied cases according to gender, myopia was recoded in 20 males versus 27 females, hypermetropia was recorded in one male versus one female, while Astigmatism was recorded in 16 males versus 15 females which means that refractive errors more prevalent in females. Which in agreement with the study of **Czepita et al.,** [14] who found that myopia occurs more frequently in females (7.4%) than in boys (5.1%) - p < 0.001. A slightly higher prevalence of astigmatism in girls (1.9%) than in boys (1.5%) was also observed (p > 0.05).

Wajuihian & Mashige [15] analyzed The gender-based prevalence of refractive errors and they found that the prevalence was high among the girls 238 (57.8%) as compared to boys 174 (42.2%). There was a statistically significant association between refractive error and the gender of the study participants (p-value < 0.001).

The current study showed Myopia and Astigmatism were more presented in the age group (20-23 years), hypermetropia were more presented in the age group (23-25 years) which means that refractive errors increased with age..

Pan et al., [16] performed a meta-analysis on age-specific prevalence of myopia among Asian population and was found to be increasing with age.

Asano [17] believed that the changes in the prevalence of astigmatism with age were mainly due to corneal changes and steepening of its curvature.

Alamri et al., [5] showed that the significantly higher proper ions of those having myopia were old, aged students, college of medicine students, and those with family history of myopia.

Huang et al., [18] found that environmental factors, including a higher level of education, more near-work, and lesser outdoor activities, may be associated with myopia. Besides, the high use of computers and smart phones is universal and extensive in daily life. The use of these equipment also plays a role in the development of myopia [19]. Highly educated population are found to have higher prevalence of myopia. Near-work, particularly continuous reading without rests, has been shown to lead to myopia [20].

The higher rate of refractive errors in medical students was probably due to high level of educational achievement, above average intelligence, long and exhaustive study schedule13, and prolonged near-work. Medical students are a group of young adults who expend prolonged periods on reading and close work. With their rigorous study schedule that spans on the average 5 to 6 years, they have been reported to be at high risk for myopia [13].

The precise pathogenic mechanisms of the myopisation of ocular refractive machinery by near-work are yet to be fully established. According to recent theory blurred retinal image that occurs during prolonged near work leads to myopia. This blurring of retinal images stimulates biochemical and structural changes in the sclera and choroid that lead to axial elongation [21]

VI. CONCLUSION

Prevalence rates of myopia in medical students are found to be quite high myopia is the predominant refractive error among the medical students and correction of refractive error could benefit the society and nation at large.

VII. RECOMMENDATIONS:

Improving awareness among medical students of refractive errors in total especially myopia as a common disorder with periodic screening for early detect and management of refractive errors is crucial to prevent its progression and burden. A regular checkup is essential to timely correct the error and to prevent deterioration of the vision.

REFERENCES

[1]. **Karki, P., Sijapati, M. J., Basnet, P., & Basnet, A. (2018).** Refractive errors among medical students. *Nepalese Medical Journal*, *1*(1), 21-23.

[2]. **Abuallut, I. I., Alhulaibi, A. A., Alyamani, A. A., Almalki, N. M., Alrajhi, A. A., Alharbi, A. H., et al. (2020).** Prevalence of refractive errors and its associated risk factors among medical students of Jazan University, Saudi Arabia: a cross-sectional study. Middle East African Journal of Ophthalmology, 27(4), 210-217.

[3]. **Morgan, I. G., Ohno-Matsui, K., & Saw, S. M. (2012).** Myopia. The Lancet, 379(9827), 1739-1748.

[4]. **Huang, L., Kawasaki, H., Liu, Y., & Wang, Z. (2019).** The prevalence of myopia and the factors associated with it among university students in Nanjing: A cross-sectional study. Medicine, 98(10), e14777.

[5]. **Alamri, A. R., Al Kaabi, H. A., & Al Jallal, M. S. (2022).** Prevalence of myopia among medical students in King Khalid University and its effects on academic performance. Bahrain Med Bull, 44(1), 299-803.

[6]. **Flaxman, S. R., Bourne, R. R., Resnikoff, S., Ackland, P., Braithwaite, T., Cicinelli, M. V., et al. (2017).** Global causes of blindness and distance vision impairment 1990–2020: a systematic review and meta-analysis. The Lancet Global Health, 5(12), e1221-e1234.

[7]. **Chaudhry, R., Ali, H., & Sheikh, N. H. (2011).** Frequency and underlying factors of myopia among medical students. Biomedica, 27(2), 154-160.

[8]. **Fledelius, H. C. (2000).** Myopia profile in Copenhagen medical students 1996–98. Refractive stability over a century is suggested. Acta Ophthalmologica Scandinavica, 78(5), 501-505.

[9]. **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.

[10]. **Basu, M., Ray, S., Mazumdar, M., Gupta, A. K., Sengupta, P., & Chatterjee, S. (2016).** Refractive Errors and its Determinants among Medical Students of Kolkata: A Descriptive Study. International Journal of Preventive and Public Health Sciences, 20162, 11-7.

[11]. **Salih, A. A. (2018).** Prevalence and progression of refractive errors among El-Mustansiriyah medical students. EJMO, 2(2), 79-83.

[12]. **Al–Rashidi, S. H., Albahouth, A. A., Althwini, W. A., Alsohibani, A. A., Alnughaymishi, A. A., Alsaeed, A. A., et al. (2018).** Prevalence refractive errors among medical students of Qassim University, Saudi Arabia: cross-sectional descriptive study. Open access Macedonian journal of medical sciences, 6(5), 940.

[13]. **Dey, A. K., Chaudhuri, S. K., Jana, S., Ganguly, P., Ghorai, S., & Sarkar, A. (2014).** Prevalence of refractive errors in medical students. Int J Health Sci Res, 4(8), 98-102.

[14]. **Czepita, D., Mojsa, A., Ustianowska, M., Czepita, M., & Lachowicz, E. (2007).** Role of gender in the occurrence of refractive errors. In Annales Academiae Medicae Stetinensis (Vol. 53, No. 2, pp. 5-7).

[15]. **Wajuihian, S. O., & Mashige, K. P. (2021).** Gender and age distribution of refractive errors in an optometric clinical population. Journal of optometry, 14(4), 315-327.

[16]. **Pan, C. W., Dirani, M., Cheng, C. Y., Wong, T. Y., & Saw, S. M. (2015).** The age-specific prevalence of myopia in Asia: a meta-analysis. Optometry and vision science, 92(3), 258-266.

[17]. **Asano, K., Nomura, H., Iwano, M., Ando, F., Niino, N., Shimokata, H., et al. (2005).** Relationship between astigmatism and aging in middle-aged and elderly Japanese. Japanese journal of ophthalmology, 49, 127-133.

[18]. **Huang, L., Kawasaki, H., Yasuda, R., & Sakai, R. (2018).** Relationship between visual acuity and lifestyle: a cross-sectional study in Japanese children. Hiroshima Journal of Medical Sciences, 67(4), 105-111.

[19]. **Fernández-Montero, A., Olmo-Jimenez, J. M., Olmo, N., Bes-Rastrollo, M., Moreno-Galarraga, L., Moreno-Montañés, J., et al. (2015).** The impact of computer use in myopia progression: a cohort study in Spain. Preventive medicine, 71, 67-71.

[20]. **You, X., Wang, L., Tan, H., He, X., Qu, X., Shi, H., et al. (2016).** Near work related behaviors associated with myopic shifts among primary school students in the Jiading District of Shanghai: a school-based one-year cohort study. PloS one, 11(5), e0154671.

[21]. **21- Choi, K. Y., Chan, S. S. H., & Chan, H. H. L. (2022).** The effect of spatially-related environmental risk factors in visual scenes on myopia. Clinical and Experimental Optometry, 105(4), 353-361.