

Prevalence of Refractive Errors and their Underlying Factors amongst students of Islam Medical College, Sialkot

FARWA TAHIR¹, IFRA TAHIR¹, FATAWAL TAHIR², MUHAMMAD TARIQ BANGASH³, ROZINA SHAHADAT KHAN⁴

¹Islam Medical College Sialkot.

²CMH Combined Military Hospital Sialkot

³Islam Medical College, Sialkot/ Betsi Cadwaladr University Health Board, Wales NHS, UK.

⁴DG Khan Medical College DG Khan

Correspondence to Dr Farwa Tahir, Email: dfarwatahir8@gmail.com Cell : 03009724141

ABSTRACT

Aim: To determine prevalence of refractive errors & underlying factors amongst students of Islam Medical College, Sialkot.

Study design: Descriptive cross sectional study.

Place and duration: At Islam Medical College, Sialkot, from August to October 2019

Methods: Our study was descriptive cross sectional study, evaluated by the formulation of a detailed questionnaire, which was answered by all respondents. One hundred and fifty students doing MBBS were selected by simple random sampling. The data was analysed using IBM SPSS.

Results: It was found out that refractive errors were present in 93 out of 150 (62%) medical students of Islam medical college. Prevalence of myopia (59.3%) was found to be the commonest type of refractive error (95.7% of those having refractive errors). On the same hand the possible underlying factors for causation of refractive errors were mainly found to be present in majority of the people having refractive errors. The greater number of the people responded about their feeling better after wearing spectacles.

Conclusion: Arising from our this study; the significance of the prevalence of refractive errors especially myopia, the presence of possible underlying factors and the positive effect of wearing the spectacles, in the students of Islam Medical College Sialkot, has been highlighted.

Keywords: Ametropes, Emmetropes, Medical students, prevalence, refractive errors, underlying factors,

INTRODUCTION

The normal state of the vision is the one in which the eye does not need any corrective lenses and at which the refractive power of the cornea and the axial length of the eye ball are so well balanced out, that the image of an object gets focused on the retina. This perfect state is called as emmetropia. While on the other hand, the state of refractive error is called ametropia. It is known to be caused by a malformation of the eyeball causing the disturbance of the balance of refractive power of the cornea, lens and the axial length that in turn leads to vision disorders where eye is unable to correctly focus the images of objects on the retina. Ametropia includes myopia (short or near-sightedness), hypermetropia or hyperopia (long or far-sightedness) and astigmatism.

World health organization (WHO) defined refractive error as following, "A refractive error is disorder of eyes that is very common. It occurs when the eye is not able to focus on targets. As a result there is blurring of vision which is sometimes so severe that it can cause visual impairment"¹.

According to World Health Organisation (WHO) it has been estimated that 153 million people worldwide have visual impairment because of the uncorrected refractive errors¹. Refractive error is havoc to public health and it also cause heavy financial load on the society². Refractive errors that are not corrected by any means like; aid by spectacles, contact lenses or correction by surgeries, create a notably significant impact on learning and academic success³. As medicals students are considered to spend maximum time in desk work, exams and assignments etc, a high prevalence of refractive errors were seen among them, while they were unaware about it⁴.

Although there are no proven facts about the exact factors that results in the causation of the refractive errors, however a few possible causative factors like; long time spent doing near work, excess of usage of digital gadgets or inappropriate light while working etc are still considered to be as the culprits. As yet, it is an established fact that refractive errors cannot be prevented but they can only be timely diagnosed and treated. If corrected in time it results in least causation of various deterioration on personal,

social and professional levels. While the possible so-thought causative factors can be avoided or lessened to improve the prognosis of the correction or slow down the slumping of the vision

With this background and considering medical students as our population regarding this important issue we decided to formulate this study to highlight the prevalence of refractive errors and their underlying causative factors that in turn summit the importance of corrected refractive errors that too majorly using the spectacles as they remain the most safe easy and easily available aid. While this timely correction can only made possible by the timely check-up and optimized follow-ups.

PATIENTS AND METHODS

A detailed questionnaire proforma was randomly distributed to medical students of Islam Medical College, Sialkot, to study the prevalence and underlying factors of refractive errors after permission from IRB. The answers of the students were tabulated and analyzed. The number of students in the study were 150, 45 males and 105 females. The presence of refractive errors like myopia, hypermetropia and astigmatism were noted by asking them relevant questions. Various factors that could contribute towards refractive errors including time spent for close work, watching television, using mobiles and other gadgets, distances for reading and watching television were also studied. The genetic factors (family history), type of light used, other eye conditions and co morbidity in the respondents were also asked for and then evaluated. The rate of progress of refractive errors and options for correction of refractive error were noted too by asking appropriate questions in the designed questionnaire. Special permission from the college authorities were taken before distributing the questionnaires. Collaboration between students and the teachers allocated to them, was established to facilitate the process of distribution and filling of the proformas. Similarly strict privacy and confidentiality and care about the academic timings was ensured at all levels till the completion of the results.

RESULTS

Statistical analysis was carried out by using SPSS. Figures consist of different tables.

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Table 1 shows us the demographic distribution of the respondents, which include 45 males (30%) and 105 females (70%) out of the total number of respondents of 150. The age distribution of the respondents was ranging from 17-26 years, with a mean age of 21 years. The maximum number of respondents are present within 21-22 years of age (i.e. 30.7%).

Table 2 shows that 93 out of 150 (62%) of the students were having refractive errors, while 57 students out of 150 (38%) were emmetropes. Prevalence of myopia amongst the respondents was 59.3% (short-sightedness) which is the most commonly occurring refractive error, prevalence of hypermetropia was 0.7% (long-sightedness) and prevalence of astigmatism was 54.7%.

Table 3 shows the results of various questions evaluated for the respondents with refractive errors (ametropes), i.e. 93 students (n=93). The results for how often the respondents (ametropes) get their eye sight checked, is as follows, 19.4% get their eye sight checked every 6 months, 28% get their eye sight checked annually, 51.6% get their eye sight checked only when they feel their prescription is getting changed (unclear vision with the lens of the present glasses), while 1.1% get their eye sight never checked. The results of rate of progress of refractive errors amongst the ametropes is as follows. Changing every 6 months 11.8%, changing every year 17.2%, changing after more than 1 year 50.5%, while 20.4% have a constant unchanged prescription for the power of their spectacles. The results of the symptoms patients (ametropes) had before glasses is as follows. Asymptomatic 8.6%, blurring of vision 37.6%, headache 19.4%, dizziness 2.2%, eye strain 8.6%, while 23.7% had more than one symptoms. The results of the problems still experienced by the ametropes with glasses is as follows. People not getting used to glasses 16.1%, blurring of the vision 8.0%, headache 11.5%, dizziness 1.1%, eye strain 5.7%, more than one symptom 4.6%, while the highest percentage i.e. 52.9% said that it gets better when wearing glasses. The time spent by ametropes for close work as follows: 37.6% spend 2-5 hours, 41.9% spend 5-10 hours, 10.8% spend 10-12 hours while 9.7% spend more than 12 hours. The distance at which the ametropes read: Close to face at 33cms 23.7%, 62.4% read at half of arm's length while 14% read at full arm length. The type of light used by the ametropes for close work. Fluorescent light 81.7% while 18.3% use reading lamp light. The

time spent by ametropes for watching television in a day. 64.5% watch television upto 2 hours, 18.3% upto 5 hours, 5.4% for more than 5 hours, 1.1% upto 10 hours and 10.8% do not watch any television. The distance for watching television by ametropes. 18.4% watch it from less than 2 meters, 40.2% from it from 2-3 meters, 21.8% from 3-4 meters and 19.5% watch it from more than 4 meters. The time spent by ametropes on mobile gadgets per day. Upto 5 hours by 64.5%, 5-10 hours by 17.2% and 18.3% spend upto 10-12 hours. The co-existence of any other eye condition amongst the ametropes which included red eyes in 10.8%, strain in 4.3%, pain in 7.5%, itching in 5.4%, halos 1.1%, 4.3% had non describable or other issues while 66.7% of the ametropes had no other eye condition present. The presence of co-morbidity in ametropes as follows. 96.8% had no co-morbidity while only 3.2% reported co-morbidity. Family history shows that, 81.7% of the ametropes family members use spectacles too, while 18.3% have no family history. The results of the ametropes who considered treatment for the removal of glasses by refractive surgery is, 35.5% considered having the corrective treatment, while 64.5% did not consider it.

Demographic distribution of the respondents

Groups	n=150
Age (Years)	17-18 (16%)
	19-20 (40%)
	21-22 (30.7%)
	23-24 (12.7%)
	25-26 (0.7%)
Gender Distribution	Male (30%)
	Female (70%)

Prevalence of refractive errors and types of refractive errors at Khawaja Muhammad Safdar Medical College, Sialkot.

Prevalence of types of Refractive Errors.	Response in percentages. n=150
Refractive Errors present	62%
Emetropes	38%
Myopia	59.3%
Hypermetropia	0.7%
Astigmatism	54.7%

RESULTS

Questions	Response in percentages amongst the ametropes. n=93						
How often do you get eye sight checked?	Every 6 month (19.4%)		Annually (28.0%)		Only after point gets changed (51.6%)		Never(1.1%)
Rate of progress of refractive errors?	Changing every 6 months (11.8%)		Changing every year (17.2%)		Changing motor than 1 year (50.5%)		Constant (20.4%)
Symptoms before glasses?	Asymptomatic (8.6%)	Blurring of vision (37.6%)	Headache (19.45)	Dizziness (2.2%)	Eye strain (8.6%)	More than one symptom (23.7%)	
Problems still experiencing with glasses?	Not getting used to (16.1%)	Blurring of vision (8.0%)	Headache (11.5%)	Dizziness (1.1%)	Eye strain (5.7%)	More than one symptom (52.9%)	Gets better when wearing glasses (2.3%)
Time spent for close work? (Hours)	2-5 (37.6%)		5-10 (41.9%)		10-12 (10.8%)		More than 12 (9.7%)
The distance at which you read? (feet)	Close to face (23.7%)		Half of arms distance (62.4%)		Full arms length (14.0%)		
Light used for close work	Fluorescence light (81.7%)			Reading lamp (18.3%)			
Time spent for watching TV? (Hours)	Upto2 (64.5%)		Upto5 (18.3%)		More than 5 (5.4%)		Upto10 (1.1%) Do not watch (10.8%)
Distance for watching TV? (Feet)	Close to TV (18.4%)		2-3 (40.2%)		3-4 (21.8%)		More than 4 (19.5)
Time spent on mobile gadgets? (Hours)	Upto5 (64.5%)		5-10 (17.2%)		10-12 (18.3%)		
Any other eye condition?	Red eyes (10.8%)	Strain (4.3%)	Pain (7.5%)	Itching (5.4%)	Halos (1.1%)	Others (4.3%)	None (66.7%)
Co morbidity present	Yes (96.8%)				No (3.2%)		
Anyone else in the family wear glasses?	Yes (81.7%)				No (18.3%)		
Consider the treatment for the removal of glasses?	Yes (35.5%)				No (64.5%)		

DISCUSSION

The most common cases, appearing as cases of eye disorder, are those of refractive errors. The common types of refractive error that too on the list are; near-sightedness, far-sightedness, astigmatism, and presbyopia⁵. In near-sightedness

far away objects cannot be focused and are seen as blurry. In case of far-sightedness and presbyopia close objects cannot be focused and are seen as blurry. Astigmatism causes objects to appear stretched out or blurry⁵. Near-sightedness is due to the length of the eyeball being too long. In far-sightedness the eyeball is too short. In astigmatism the cornea being the wrong shape. Where as

in presbyopia aging of the lens of the eye occurs such that it cannot change shape sufficiently to focus the image on the retina⁵. Some refractive errors occur more often among those whose parents also have refractive errors⁵. Diagnosis of the refractive errors can only be done by eye examination⁵. Refractive errors are corrected with various methods like eyeglasses, contact lenses, or surgery⁵. Eyeglasses are the easiest and safest method of correction⁵. Contact lenses can although provide a wider field of vision but they are associated with a risk of infection⁵. Refractive surgery permanently changes the shape of the cornea⁵.

Globally the number of people with refractive errors has been estimated as one to two billion⁶. Rates vary between regions of the world with about 25% of Europeans and 80% of Asians affected⁶. Near-sightedness is the most common disorder⁷. Rates among adults are between 15-49% while rates among children are between 1.2-42%⁸. Far-sightedness more commonly affects young children and the elderly^{9,10}. Presbyopia affects most people over the age of 35⁵. The number of people with refractive errors that have not been corrected was estimated at 660 million (10 per 100 people) in 2013¹¹. Of these 9.5 million were blind due to the refractive error¹¹. It is one of the most common causes of vision loss along with cataracts, macular degeneration, and vitamin A deficiency¹². There is evidence to suggest genetic predilection for refractive error. Individuals that have parents with certain refractive errors are more likely to have similar refractive errors⁵. The Online Mendelian Inheritance in Man (OMIM) database has listed 261 genetic disorders in which myopia is one of the symptoms¹³. Many genes that have been associated with refractive error are clustered into common biological networks involved in connective tissue growth and extracellular matrix organization¹⁴. Although a large number of chromosomal localisations have been associated with myopia (MYP1-MYP17), few specific genes have been identified¹³. In studies of the genetic predisposition of refractive error, there is a correlation between environmental factors and the risk of developing myopia¹⁶. Myopia has been observed in individuals with visually intensive occupations¹⁵. Reading has also been found to be a predictor of myopia in children. It has been reported that children with myopia spent significantly more time reading than non-myopic children who spent more time playing outdoors¹⁵. Socioeconomic status and higher levels of education have also been reported to be a risk factor for myopia.

Our study was conducted amongst the medical students, who are relatively more exposed to near work. The overall occurrence of refractive errors in our study was 150(62%), with myopia being the most common type with prevalence of 59.3% (97.5% of ametropes, excluding emetropes). The data matches other similar studies in medical students of Pakistan (58%)¹⁷, Norway 93(50%)¹⁸ and Copenhagen (50.3%)¹⁹. Yet, Lower prevalence of refractive errors has been reported in Turkey (32.9%)²⁰. The prevalence of refractive errors reported in our study is much lower than that reported in Taiwan (93%)²¹, Singapore (90%)²² and China (71%)²³ where the prevalence of refractive errors is much higher than that observed in our study.

The higher rate of refractive errors, especially myopia, in medical students was possibly due to many contributing factors such as, the high level of educational achievement²⁴, above average intelligence²⁵, long and exhaustive study schedule and prolonged near work²⁶ as compared to majority of the other non-medical students. Medical students are a group of young adults who spend prolonged periods on reading and close work. With their rigorous study schedule that spans an average of 5 to 6 years, they have been reported to be at high risk for myopia^{18,22,23,26}. This is evident from our study conducted amongst the medical students.

The precise pathogenesis of myopisation of ocular refractive machinery by near work is yet to be fully established and understood. According to a recent theory, the blurred retinal image that occurs during prolonged near work leads to myopia. This blurring of retinal images stimulates the biochemical and chemical changes in sclera and choroid that lead to axial elongation²⁷.

WHO started a program "vision 2020", The mission of the VISION 2020 Global Initiative is to remove the main causes of all preventable and treatable blindness as a public health issue by the year 2020, with the target to achieve vision of 20/20, i.e. 6/6 for everyone by the year 2020. It focuses on every person right to sight, with the aim to reduce the visual disability and blindness²⁸. Eighty percent of the visual impairment in young people between the ages of 12 to 15 years is due to the refractive errors in USA²⁹. Prevalence of myopia is greater than hypermetropia and there is an expected rise of myopia patients to 2.6 billion by the year 2020. This shows that how much important it is have the timely correction of the refractive errors.

CONCLUSION

The prevalence of refractive errors especially high rate of myopia amongst the medical students of Islam Medical College, having all possible causative factors, contributing in the causations of refractive errors, marked as positive is very much highlighted which becomes better only after interventions like wearing of spectacles .

Conflicts and interests: This study has no conflict of interest to be declared by the authors

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