

---

ORIGINAL ARTICLE

# Prevalence of Myopia and Peripheral Retinal Degeneration in Medical Students of Fatima Jinnah Medical University

<sup>1</sup>HUMA KAYANI, <sup>2</sup>HIZB-UR-RAHMAN, <sup>3</sup>MAHAM JAVED, <sup>4</sup>KASHIF JAHANGIR, <sup>5</sup>SEEMAB AKBAR

<sup>1</sup>Professor Ophthalmology FJMU/SGHR, <sup>2</sup>Senior Registrar Ophthalmology SGRH, <sup>3</sup>Postgraduate Resident FJMU/SGRH, Lahore <sup>4</sup> Assistant Professor Ophthalmology FJMU/SGRH, <sup>5</sup>Postgraduate Resident Ophthalmology FJMU/SGRH, Lahore.

Correspondence Author:-Huma Kayani, Professor of Ophthalmology FJMU/SGHR, Lahore.

## ABSTRACT

**Introduction:** Prevalence of refractive error especially myopia in medical students is high. Documented data pertaining to this question this is not well surveyed in medical students of Pakistan.

**Objective:** The present study will aim to determine the prevalence rate of myopia in medical students of female medical university in Pakistan.

**Study design:** Cross sectional, observational study

**Materials and Methods:** 250 female medical students of 4<sup>th</sup> year Fatima Jinnah Medical University were evaluated for myopia and dilated fundus examination to rule out peripheral retinal degeneration associated with myopia. All students' myopic refractive error was assessed using retinoscope and auto-refractometer. Refractive errors have been further categorized according to the Dioptric power. Pupil dilation done with help of tropicamide and retinal examination with indirect ophthalmoscopy and non-contact lens slit lamp biomicroscopy.

**Results:** Out of 250 medical students, 153 (61.2%) were Myopes. Further subdivision showed 105 (68.63%) as low myopes, 44 (28.76%) as moderate and 4(2.61%) as high myopes. Genetic influence of either or both parents was found in 110 (71.9%) Of myopes. Peripheral retinal degeneration was found in 33 (21.6%) eyes with retinal breaks in 5 (3.2%) eyes.

**Conclusion:** Prevalence of myopia is high in medical students and they are more prone to developing early peripheral retinal degeneration.

**Key words:** myopia, peripheral retina degeneration

## INTRODUCTION

Myopia usually begins in adolescence; as a result of growth causing change in the size of the eyeball. This change in refractive error is governed by both genetic and environmental factors. Studies have shown that there has been a dramatic increase in myopia prevalence rate over the past few decades in different parts of Asia<sup>1</sup>Though refractive errors may be corrected using spectacles and contact lenses; they realistically produce a large economic burden<sup>2</sup>

Other reports published in the end of last century produced an alarming response to show that it is academically active professionals that are the major sufferer of this problem<sup>3</sup>. Medical students with their intense demanding professional studies put them at a greater risk of developing and worsening refractive errors like myopia and astigmatism. Recently various studies have documented a rise in myopia in medical students. Though unproven, it's probably related to the long hours of reading requiring continuous

accommodation. Woo et al postulated high prevalence of myopia in medical students which could be due to the fact that medical students are a select population with a high level of education as well as above-average intelligence and longer reading hours.<sup>4</sup>Knowing the type and level of refractive error which has become epidemic in Asian population can help develop public health strategies.

Over the last few years, studies on refractive error in medical students have been conducted in Singapore, Taiwan and India. Very little data about the prevalence of refractive errors among medical students in Pakistan is available. With the increase in the number of medical colleges and universities in Pakistan, it is necessary that such research is done in our local medical institution to find out the refractive status of these young budding medical practitioners. The present study intends to throw light on the above perspective and help develop strategies to manage. The present study is conducted with this research hypothesis in mind.

To, evaluate the refractive error in students of female medical university of Lahore.

## MATERIAL AND METHODS

The whole class of 300 female medical students of third professional (4<sup>th</sup> year) Fatima Jinnah Medical University were invited to participate in the study. This is the only female medical university of its kind in South East Asia. The study was conducted in one academic year, starting from December 2015 to September 2016. All female participants age ranged between 20-25 years. Girls were explained the research project and its rationale, the procedure, its risks, benefits, and the assertion of confidentiality of the findings. Informed consent was taken by each individual, before recording visual acuity and examining the ocular structures. Demographic data such as age, gender and parental history of myopia was recorded in preformed questionnaire. Study participants were informed pre-hand not to wear contact lenses on day of examination to avoid errors in study. Visual acuity was recorded in the Ophthalmology out-clinic timing using Snellen's visual acuity chart for distant vision at 6 meters. Using Retinoscope and auto refractometer, refractive error was identified corrected to best corrected visual acuity and categorized as Myopia, Astigmatism and Hypermetropia. Myopic eyes were further categorized according to the dioptric power into low, moderate and high myopia. The refractive values were noted using retinoscopic findings and trial box. The readings were taken by an experienced department optometrist. Cycloplegia was not required. Ocular examination using Slit-lamp for anterior segment and detailed fundus examination (especially peripheral retina) with slit lamp biomicroscopy with non-contact and indirect ophthalmoscope was performed after dilating pupils with tropicamide eye drops. This was done by single VR consultant.

Myopia was categorized as low when it was between -0.5-3 Dsp, moderate, -3-6 Dsp and High -6.0Dsp and above. Hypermetropia was labeled with spherical equivalent of +0.5 Dsp and above. Astigmatism (Dcyl) in any axis.

Analysis was done

**Inclusion criteria:** all undergrad 4th year medical students' girls of FJMU.

**Exclusion Criteria:** Pathological ocular cause of refractive error e.g. previous ocular trauma, corneal repair, ocular inflammation, ocular surgery, retinal surgery.

Statistical data analysis and calculations were carried out using Fischer exact test.

## RESULTS

Out of 300 female medical students of 4th year, 250 were examined. The rest did not volunteer for examination. All except 20 examined (8%, foreign students) were Pakistani in origin. All examined were females between the ages of 20 years (minimum) and 25 years (maximum), with mean of 21.58 years SD 0.75. There was a strong family history of refractive error (Myopia) in the study group with 108 (71.9%) out of 250 myopic students acknowledging either or both parents to be myopic.

Out of 250 examined, 153 (61.2%) were having myopia. Of these, majority, 105 examined (68.63%) fall in the category of low myopia (-0.5-3.0 Dsp), 44 girls (28.76%) were moderate myopic and the remaining 4 students (2.61%) were high myopes. Of these 153 myopes, the prevalence rate of myopic astigmatism was 31 (20.3%) while rest was only myopes. Only one female student was hypermetrope with refractive value of +2.0 Dsp.

Anterior segment slit lamp examination revealed no significant finding in any of the examined students. Of the Fundus examination using indirect ophthalmoscope and slit lamp biomicroscopy with 90 D superfield non-contact lens revealed peripheral retinal degeneration in 33 (21.6%) of these students. Out of 105 girls with low myopia, 9 (5.9%) showed lattice degeneration in peripheral retina. From 44 moderate myopes, 17 (11.1%) had retinal degeneration and in case of 4 students with high myopia >6D, 2 (1.3%) showed signs of peripheral retinal degeneration. Of 44 students with moderate myopia, 5 (5.3%) had retinal breaks in addition to peripheral retinal degeneration. These five females were advised prophylactic argon laser as barrier around break to seal it.

**Table 1:** Age of the study Participants (n=153)

Mean	SD	Minimum	Maximum
21.58	.75	20.00	25.00

**Table 2:** Visual acuity of the Study Participants

BCVA	(n=153)	%
6/3	1	7%
6/6	150	98.0%
6/9	1	7%
6/12	1	7%

**Table 3:** Refraction Status of the Study Participants

Refraction	Mean ± SD	Minimum	Maximum	N (%)
Right Eye	-2.50±1.84	-13.00	0.00	31
Left Eye	-2.43±1.70	-10.00	0.00	
Astigmatism	-	-	-	

**Table 4:** Family History of the Study Participants

Family History	(n= 153)	%
Positive	110	71.9%
Negative	43	28.1%

**Table 5:** Fundoscopy revealing degeneration among study participants

Fundoscopy	(n=153)
NAD	120
AD	33

**Table 6:** Association of Fundoscopy with Family History of the study Participants

Family History	Fundoscopy		Total	P-Value
	AD	NAD		
Positive	29	81	110	0.028
Negative	4	39	43	
Total	33	120	153	

{By applying Fisher Exact test there is significant association was found between fundoscopy and family history of myopia (P-Value=0.028).}

**Table 7:** Degree Of Myopia in participants (N= 153)

Types	n	%
Mild (0.5-3.0Dsp)	105	68.63
Moderate (3.0-6.0 Dsp)	44	28.76
Severe (> 6.0 Dsp)	4	2.61

**Table 8:** Peripheral Degenerations According To Degree of Myopia(N=153)

Types of Myopia	n	%
Mild	9	5.9
Moderate	17	11.1
Severe	2	1.3
Severe With retinal breaks	2	1.3
	5	3.2

## DISCUSSION

Refractive errors especially myopia is on a rise in children and young adults. Visual impairment due to refractive error, results in great financial burden on public sector especially in developing countries where health insurance policies and patients support is poor in terms of daily wages. Worldwide, the cost related to the correction of myopia, including refractive eyewear, contact lens wear and refractive surgery, is estimated to be in excess of SGD \$150 million a year.<sup>5</sup>

The prevalence rates of myopia in Asian countries vary from 50% in Chinese children<sup>6</sup> to 84% in Taiwan and Hong Kong<sup>7</sup>. In Singapore, the prevalence of myopia is one of the highest worldwide, affecting 28% of school children at the start of their primary education and 70% of those completing university education<sup>8</sup>. Myopia, its progression and severity is associated with the level of educational attainment. Medical education worldwide is a demanding professional education requiring long hours of reading and learning using extensive near vision and accommodation. Thus researchers in different countries have focused their research on this group of learners in finding out the type of refractive error, its severity and associations.

Our study focuses on the fourth year medical students of Fatima Jinnah medical university, the only female institute of its kind in South East Asia. Out of 250 females who volunteered to participate in the study, 153 (61.2%) were diagnosed with myopia. All girls fall in the age group between 20-25 years. This is alarming number. Chow et al conducted similar study on 128 Singaporean medical students and documented 82% to be myopic medical students<sup>9</sup>. Another study conducted by Woo et al yet again on 157 Singaporean second year medical students revealed 89.8% students to be myopic. 10 Woo et al study has one similarity to our study. They focused all students of one year i.e. second year while we studied fourth year. This narrows down study to specific age range. Another study on 345 medical students in Taiwan showed that more than 90% of Taiwanese medical students were myopic. All these studies show that their myopic students are way higher than our student population proving that Chinese origins are more prone to myopia. Asim Kumar et al published data of 580 Indian medical students with refractive error in 330 (56.90%) and Myopia 208 (63.03%)<sup>11</sup>. Though the number of participants are more in their study

group yet the percentage result is almost the same as our study group. Studies on medical students in Norway (140)<sup>7</sup> and Denmark (147)<sup>12</sup> yielded relatively low prevalence rates of 50.3% and 50%, respectively. These European studies show lower myopic percentage than the Asian esp. Chinese population.

However, our study group is different from the rest in terms of gender. All our participants were females while all other studies represent data on both genders. Thus we couldn't discover the myopic gender ratio. High myopia was more prevalent in female myopia in Chinese study. Among the 120 myopic students, 77 (64.2%) were females in study published by S.Gopalakrishnan.<sup>13</sup> This correlates with a Greek study which reported that the prevalence rate of myopia was higher in female students than their male counterparts.<sup>14</sup>

Genetic and environmental influences play a role in vital development and progression of myopia. Our study showed a strong genetic influence with 110 (71.9%) students either or both parents having refractive issues. This is way higher than that highlighted by **Shiny George et al 15** who in his study documented that of 39.5% Indian myopic medical students interviewed, 40.6% had positive family history of myopia ( $p = 0.003$ ). Parental history was also noted in 31 students ( $n=120$ , 87.6%) in study done by S. Gopalakrishnan et al.<sup>13</sup> Majority of our students 105 (68.7%) were low myopia ( $-0.5$  to  $-3.0$ Dsp) and moderate 44 (28.76%). In a study done in Malaysia by S.Gopalakrishnan et al.<sup>13</sup> of 240 medical students with myopia, 216 eyes had low myopia which was up to  $-6.0$ D and 24 eyes had high myopia. The mean value for low myopia in 216 eyes was  $-3.04$  D while the mean for high myopia in 24 eyes was  $-7.17$  D. Though our classification is sub-divided into low, moderated and high myopia and the Malaysian study classification is only low and high yet combining the two gives similar results in both studies.

Fundoscopy findings in our study population showed presence of peripheral degeneration in 33 eyes (21.6%). In addition to degeneration, 5 eyes in the moderate myopia group had one or multiple breaks most commonly seen in the super temporal quadrant of peripheral retina. These eyes were advised prophylactic argon laser application as barrier around the break. No study comparing findings of peripheral retinal degeneration in medical students was available.

Medical students are shown to have a higher

prevalence of myopia. This may be due to long study hours with concentrated near work predisposing them to development of myopia. It has been documented that excessive near work indulged by students is a known risk factor for myopia.<sup>16</sup> There is also a possibility that academic competition led to selection of more myopes for medical education.

## CONCLUSION

This study data presented showed prevalence of myopia was high among medical students of the institution under study. Other study references showed percentage was more so in Chinese population but countries of South East Asia like India and Pakistan are not far behind. Excessive near work may be the predisposing factor. Significance of genetic predisposition, type of myopia and peripheral retinal degeneration was well documented in our study. Peripheral retinal degeneration is more commonly seen in this refractive error making these students vulnerable to complications like retinal breaks and detachment. Regular counseling and follow-up is required to avoid vision threatening complication of myopia.

## REFERENCES

1. Lin LL, Shih YF, Tsai CB, Chen CJ, Lee LA, Hung PT, et al. Epidemiologic study of ocular refraction among schoolchildren in Taiwan in 1995. *Optom Vis Sci* 1999;76:275-281
2. National Advisory Eye Council. Vision Research. A national plan: 1983-1987. Bethesda, MD: United States Department of Health and Human Services, National Institutes of Health
3. Kinge B and Midelfart A. Refractive changes among Norwegian university students. A three year longitudinal study. *Acta Ophthalmol Scand* 1999; 77: 302-305
4. Woo WW, Lim KA, Yang H, Lim XY, Liew F, Lee YS et al. Refractive errors in medical students in Singapore. *Singapore Med J* 2004; 45: 470-474
5. Saw SM, Gazzard G, Au Eong KG, Koh D. Utility values and myopia in teenage school students. *Br J Ophthalmol* 2005; 87: 341-5.
6. Chung KM, Mohidin N, Yeow PT, et al. Prevalence of visual disorders in Chinese schoolchildren. *Optom Vis Sci*, 2006 ; 73: 695-700.
7. Midelfart A, Kinge B, Midelfart S, et al.

- Prevalence of refractive errors in young and middle-aged adults in Norway. Acta Ophthalmol Scand, 2006; 80: 501-5.)
8. Chua WH, Saw SM, Wu HM, Hong CY, Chan WY, Wong A, et al. Refractive errors in schoolchildren: the Singapore Myopia Cohort Study. In: Thorn F, Troilo D, Gwiazda J, editors. Proceedings of the VIII International Conference on Myopia; 2006 July 7 – 9; Boston, United States. United States: Conference on Myopia, 2006: 11.
  9. Chow YC, Dhillon B, Chew PT, Chew SJ. Refractive errors in Singapore medical students. Singapore Med J. 2008 Oct; 31 (5): 472-3.
  10. W W Woo, K A Lim, H Yang, X Y Lim, F Liew, Y S Lee, S M Saw. Refractive errors in medical students in Singapore Singapore Med J 2004 Vol 45(10) : 470
  11. *Asim Kumar Dey, Soumen Kumar Chaudhuri, Subhasis Jana.* Prevalence of Refractive Errors in Medical Students. IJHSR. 2014; 4(8): 98-102
  12. Fledelius H. Myopia profile in Copenhagen medical students 2006 – 2008. Refractive stability over a century is suggested. Acta Ophthalmol Scand 2000; 78: 501-5.
  13. Dr. M.V.S Prakash, Dr. Ranjit Kumar Jha.- A Study of Refractive Errors among Medical students in AIMST University, Malaysia. INDIAN MEDICAL JOURNAL November 2011 (Annexure) Vol.105, No.11 365[A]
  14. Mavracanas TA, Mandalos A, Peios D, Golias V, Megalou K, Gregoriadou A, et al. Prevalence of myopia in a sample of Greek students. Acta Ophthalmol Scand 2000;78:656-9.
  15. Shiny George, Biju Baby Joseph. Study on the prevalence and underlying factors of myopia among the students of a medical college in Kerala. Int J Med Res Health Sci. 2014;3(2):330-337
  16. S.M. Saw, W.H. Chua, C.Y. Hong, H.M. Wu, W.Y. Chan, K.S. Chia, R.A. Stone and D. Tan, Nearwork in early-onset myopia, Investigative Ophthalmology and Visual Science, 43(2), 2002, 332-339.