A cross-sectional study of refractive errors between medical students of Indian and Malaysian Medical Colleges, At Belagavi

Khundmeer Banu Athani[1,*], Rajashekar R.K[2], Vinay Dastikop[3], Kamarudin Jaalam[4], Sadanand B. Patil[5]

[1]PG Student, [3]Professor & HOD, Dept. of Ophthalmology, Belagavi Institute of Medical Sciences, Belagavi, [2]Professor & Head, Dept. of Physiology, [4]Professor, Dept. of Medicine, USM-KLE International Medical Programme, Belagavi, [5]Professor, Dept. of Biochemistry, JN Medical College, Belagavi

*Corresponding Author:
Khundmeer Banu Athani
PG Student, Dept. of Physiology, Belagavi Institute of Medical Sciences, Belagavi
Email: drkhundmeer117@yahoo.in

Abstract

Introduction: Of all the human senses, the sense of vision is used the most and so, is affected the most. Refractive errors are becoming a more problem of concern, especially Myopia has become very common problem. The epidemiology of refractive errors seen over a generation mainly influenced by environmental changes namely stress and time spent in education, where the student's population group requires a considerable attention.

Objectives:
1. To compare the prevalence of Refractive errors between medical students.
2. To study "Gender difference" in the prevalence of refractive errors.
3. To know the involvement of "Ethnicity" factor in the prevalence of refractive errors.

Materials and Methods: Study consisting of 100 Indian medical students from Belagavi Institute of Medical Sciences (BIMS), Belagavi and 100 Malaysian medical students of USM-KLE, International Medical Programme (USM-KLE) Belagavi, of all the five phases, who were tested for presence of Refractive errors with the help of Snellen's chart, Jaegers chart and confirmation by pinhole test.

Result: Overall prevalence of Refractive errors was high in USM-KLE students 65% than BIMS students 54%, Female students being more affected than males in both groups in all the errors. Especially Myopia had more prevalence in USM-KLE students 65% than BIMS students 46%, Myopia with astigmatism in USM-KLE students was 14% and in BIMS students 7%.

Statistical Analysis: Basic data will be presented in percentage and the association between the variables will be done by using Chi-square test.

Conclusion: The prevalence of refractive errors was more in USM-KLE students than BIMS students, females being more affected than males in both groups in all the refractive errors, which could be due to ethnic variations, genetic predisposition, higher levels of education with more near work activities and longer study periods.

Keywords: Refractive errors; Medical students.

Introduction

In modern Human society, everyone is surrounded and influenced by technology in its various forms, in day to day activities. Of all the human senses, the sense of vision is used the most and so, is affected the most[1]. The epidemiology of refractive errors seen over a generation mainly influenced by environmental changes namely stress and time spent in education, where the student's population group requires a considerable attention[2].

Refractive errors are becoming a more problem of concern in our societies and are more prevalent among the high educational group. Refractive errors constitute a sizeable proportion of eye OPD in India[2]. They are one of the most common causes of visual impairment around the World and second leading cause of treatable blindness[3].

Refractive errors remain one of the primary causes of visual impairment in children worldwide[4]. For students, uncorrected refractive errors lead to a considerable impact on learning, academic achievement and by extension employability[5].

Especially Myopia has become a very common problem. Modern epidemiology of myopia is being influenced by stress, time spent in full time education and other environmental factors. Several studies describe an increasing prevalence of myopia in recent years. One group which requires attention is the student population, because they are subjected extensively to work where maximal vision is used. Thus, knowledge of prevalence of refractive errors in them and their correlation with gender, type of diet, religion [ethnicity] and education stream would help to plan the effective refraction services, because refractive errors are responsible for a significant proportion of moderate visual impairment in this population[2].

As per WHO report, uncorrected refractive error remains the second commonest cause of global visual impairment next to the cataract[6]. The overall incidence of Refractive errors has reported between 21% and 25% of patients attending eye OPD in India. Refractive errors are responsible for a significant proportion of blindness and moderate visual impairment in Indian population[7]. Refractive error is a remedial cause of

visual impairment with correction of significant Refractive errors being a priority of "Vision 2020: The right to sight", the joint global initiative of World Health Organization [WHO] and the International Ageing for prevention of Blindness[8].

Novelty of this study: This study explains about the present increasing prevalence of Refractive errors in medical students with the involvement of gender and ethnicity factor.

Objectives

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Materials and Methods

This is a Cross-sectional study. Institutional ethical clearance from Ethical clearance committee and written informed consent from subjects were obtained. A total of 200 subjects were studied, which includes 100 Indian medical students from Belagavi Institute of Medical sciences Belagavi [BIMS] and 100 Malaysian medical students from USM-KLE International medical programme Belagavi, with 50 male and 50 female students in each group. All the five phases of students from MBBS first to final year including interns, with 20 students from each phase that is 10 girls and 10 boys from each phase were included in the study by random selection.

Sampling method and Sampling technique: 20 students from each phase have been selected randomly for the study.

The purpose and procedure of the study was explained to all the students. The test for BIMS students was carried out in the OPD of Department of Ophthalmology at BIMS Hospital, Belagavi and for the Malaysian students in the Lecture hall of USM-KLE International medical programme.

Students were examined by assessing the visual acuity from a standard Snellen's chart for far vision and Jaeger's chart for near vision. Students who were using glasses, lens or had taken some surgical intervention [LASIKS] were taken as having refractive errors, while students not having glasses were further investigated. Those having a visual acuity less than 6/6 in one or both eyes were tested for the presence or otherwise of a refractive error by Pinhole testing [indicating refractive error]. By referring the article, sample size (200) was scientifically calculated[1] by using the formula as follows;

$$n = Z^2 pq / d^2$$
$$= 1.96^2 \times 45.04 \times 54.96 / 10^2$$
$$= 95 \text{ in each group}$$ {we have taken 100 Indian and 100 Malaysian students}

Where, Z – Z value for alpha error = 1.96

P - Proportion of refractive error of first year MBBS students= 45.04 %

q – 100- P = 54.96

d –10% absolute error

Inclusion criteria: MBBS First to Fifth year that is including intern students in the age group of 18 to 24 years and of both sexes from Belagavi Institute of Medical sciences (BIMS) and USM- KLE, International Medical Programme, medical colleges were selected by random selection of the students.

Exclusion criteria: Students with any eye abnormality, any present or past history of any eye diseases, Diabetes mellitus, history of trauma to eye , an insult like history of retinopathy, prematurity, genetic and connective tissue diseases associated with refractive errors were excluded.

Procedure

Snellen's Chart: The subject is seated at a distance of 6 meters (20 feet) from a well-lighted chart and is asked to read the letters down the chart as far as subject can read. Each eye is tested separately with glasses as well as without glasses. A normal person should be able to read at least the 7th line that is, have a visual acuity of 6/6[9].

Jaegers Chart: The subject is asked to read Jaegers chart held at the ordinary distance of 15 inches. This chart is made up of reading material of various sizes with the smallest size at the bottom. A modification of the original Jaegers system is used and visual acuity is expressed in terms of printer's point system-N5 is smallest type and largest type is N36[9].

Pinhole Test: It helps in confirming whether the optical correction in trial frame is correct or not. An improvement in visual acuity while looking through a pin-hole indicates that optical correction in trial frame is incorrect[10].

Statistical Analysis: The data obtained was statistically analyzed by using Chi-square test.

Observation and Results

Total sample size		
	BIMS Medical Students	USM-KLE, IMP Medical Students
Males	50	50
Females	50	50
Total	100	100
Grand total	200	

Overall Prevalence of Refractive errors in BIMS and USM-KLE medical students		
	BIMS Medical Students	USM-KLE, IMP Medical Students
Males	23	32
Females	31	33
Total	54	65
Chi-square	1.11	
P-value	>0.05	

BIMS Belagavi medical students					
	Sample size	Myopia	Astigmatism	Myopia with Astigmatism	Hypermetropia
Males	50	20	6	2	0
Females	50	26	8	5	0
Total	100	46	14	7	0
Chi-square	-	0.78	0.29	1.29	-
P-value	-	>0.05	>0.05	>0.05	-

USM-KLE Malaysian medical students					
	Sample size	Myopia	Astigmatism	Myopia with Astigmatism	Hypermetropia
Males	50	32	5	5	0
Females	50	33	9	9	0
Total	100	65	14	14	0
Chi-square	-	0.02	1.14	1.14	-
P-value	-	>0.05	>0.05	>0.05	-

Comparison between BIMS and USM-KLE medical students-Males					
	Sample size	Myopia	Astigmatism	Myopia with Astigmatism	Hypermetropia
BIMS Males	50	20	6	2	0
USM-KLE Males	50	32	5	5	0
Total	100	52	11	7	0
Chi-square	-	2.76	0.10	1.28	-
P-value	-	>0.05	>0.05	>0.05	-

Comparison between BIMS and USM-KLE medical students-Females					
	Sample size	Myopia	Astigmatism	Myopia with Astigmatism	Hypermetropia
BIMS Females	50	26	8	5	0
USM-KLE Females	50	33	9	9	0
Total	100	59	17	14	0
Chi-square	-	0.84	0.06	1.14	-
P-value	-	>0.05	>0.05	>0.05	-

Foot note: P value ‹ 0.05 is considered as significant.
BIMS –Belagavi institute of medical sciences Belagavi.
USM- KLE – Karnataka lingayat education international medical programme.

By using Chi-square test our study showed that, the overall prevalence of refractive errors was, out of 100 BIMS students 54% that is 23% males and 31% females had refractive errors whereas in USM-KLE students out of 100, 65% that is 32% males and 33% females had refractive errors, indicating that prevalence of refractive errors is more in USM-KLE students than in BIMS students with females being more affected than males in both the groups which was statistically not significant.

Among the refractive errors the prevalence of Myopia was more in both the groups. In BIMS students it was 46% that is 20% males and 26% females,

whereas in USM-KLE students the prevalence was 65% with 32% males and 33% females. This indicates that the prevalence of myopia is more in USM-KLE students than BIMS students with females mainly USM-KLE female students being more affected, which was statistically non-significant.

None of the students had Hypermetropia in BIMS as well as in USM-KLE student's population.

The prevalence of Astigmatism was second common after myopia. It was 14% with 6% males and 8% females in BIMS students and also 14% in USM-KLE students with 5% males and 9% females, indicating overall almost equal prevalence in both the

groups but females were more affected mainly the USM-KLE females, which was statistically not significant.

The prevalence of myopia with astigmatism was also found to be high in USM-KLE students than BIMS students. It was 7% that is 2% males and 5% females in BIMS students and 14% with 5% males and 9% females in USM-KLE students, indicating more prevalence in females, mainly USM-KLE female students than males in both the groups which was not statistically significant. One male USM-KLE student was found to have compound myopia with astigmatism.

Among the lens power of refractive errors the most commonly found in BIMS students was -1.00 D, -0.75D, -0.50D and -2.25D. Among USM-KLE students it was -1.00 D, -0.75D, -2.75D, -0.50D, -1.50D, -2.00D, -4.00D and -5.00D.

Discussion

The correctable refractive errors of eye are creating a specific burden on human resource as well as economy worldwide. India is also not exempted from this problem. Most of the time young age group and especially those engaged in near work are found to be vulnerable to this crisis, so need to be paid attention at all the stages of socio-academic-health-economic point of development. Thus the present study of refractive errors in medical students itself implies its own importance to be taken up.

Our study was conducted between medical students of BIMS and USM-KLE medical colleges at Belagavi, who are more exposed in performing near activities.

Overall prevalence of refractive errors in our study in BIMS students was 54% with 23% males and 31% females and in USM-KLE students was 65% with 32% males and 33% females. This indicates that there is increased prevalence of refractive errors in USM-KLE students than BIMS students along with, showing the Gender difference that is increased prevalence in females than males in both the groups. These differences in prevalence rates in both the groups of medical students may be attributable to ethnic variations and different genetic predispositions.

A study reported the high prevalence of Refractive errors amongst medical students and unawareness about it, which can help in estimating the need for Refractive correction and reduce the visual impairment due to Refractive errors[1].

Educational status has been shown to be closely related to near work and association between near work activities and myopia has been reported previously, which has also been used in support of the "use-abuse theory" and myopia[11].

Among the refractive errors Myopia is the most common type. Prevalence of myopia in BIMS medical students was 46% with 20% males and 26% female students and USM-KLE students was 65% with 32% males and 33% female students, indicating increased prevalence in USM-KLE medical students than BIMS medical students along with increased prevalence in female students mainly of USM-KLE than male students, which could be due to the ethnic variations, different genetic predispositions, higher levels of education which is associated with near work activities and long study periods.

A study showed that there is increasing number of students having refractive errors in successive years and also myopia is common with majority of students having a mild to moderate degree of myopia[1]. Reports on prevalence of myopia in medical students in Asian countries showed higher rates of 82% and 89.8% in Singapore[12], 92.8% in Taiwan[13] and 87.6% in Malaysia[14].

Similar studies on medical students in Norway, Denmark and Turkey yielded relatively lower prevalence rates of 50.3%, 50% and 32.9% respectively[15], which corroborates with our study.

Higher prevalence rates of myopia have been reported among medical students across several studies in many countries[16]. A Greek study reported higher prevalence rate of myopia in females, which showed no overall statistical significance[17], which correlates with our study. The role of gender on refractive errors is inconclusive[18], which could be assumed that since growth spurt appears much earlier in girls, the eye tends to attain longer axial length and consequently higher axial myopia. In Post-pubertal periods, boys catch up and ocular measurements in both sexes then even out.

Study conducted in Indian medical students in 1979 has shown myopia prevalence among medicos as 24%[19], corroborating with our study. Study results have shown that the prevalence rate of myopia in Indian medical students has increased over past two decades. In contrast, a study reported as no difference in myopia prevalence between males and females[2]. But another study reported myopia more common in males while assessing myopia prevalence in general population[20], which could be because of interference of other factors which affect the prevalence of myopia like maladjusted education study levels.

High prevalence rates of myopia have been reported among medical studies because of the high level of educational attainment[21], long and intensive study regimen[22] and prolonged near work[13].

High prevalence of myopia was found among AIMC students 57.6% and first and second year students had greater percentage indicating that it is increasing in younger age group and showed that excessive intelligence and school work which newer students have to undertake leads to early development of myopia[23]. Several factors including genetic and environmental influences like near work, night lighting and uv exposure are also play role in determination of Refractive status of eye but the true underlying mechanism remain unclear[24].

The prevalence of astigmatism was equal in both BIMS and USM-KLE medical students. In BIMS students it was 14% with 6% males and 8% females and in USM-KLE students it was 14% with 5% males and 9% females, showing gender difference that is more prevalence in females than males.

Myopia is the predominant Refractive error detected among medical students[25]. Myopia is the most common Refractive error found in students followed by astigmatism and hyperopia. Same pattern of distribution of Refractive errors were observed in general adult Indian population that is, 34.6% myopia, 37.6% astigmatism and 18.4% hyperopia[26].

A study in students from Northern Greece reported prevalence of astigmatism was 10.2%, it has also reported that females ran a significantly higher risk of astigmatism than males[27], which corroborates with our study. In contrast, a study in Singapore school children reported equal prevalence rates of astigmatism in males and females[28]. Another study reported astigmatic prevalence was found significantly higher in males than in females[2]. The prevalence of astigmatism was found more in medical and engineering students as compared to arts students. The difference in prevalence of astigmatism and its relationship with gender reported by different studies can be explained by the fact that astigmatism is hereditary and varies widely between and within the racial groups[29]. We could not find any study comparing astigmatism with respect to education stream and this needed to work more in this area.

The prevalence of Hypermetropia in both BIMS and USM-KLE students was nil, 0.00%. A study reported very less prevalence of Hypermteropia[2], which correlates with our study. The prevalence of Hypermetropia was 1.3% in Singaporean medical students[30]. Low rates of Hypermetropia found in students could be because of Hypermetropia declines with increasing years of education[31]. Higher rates of Hypermetropia were found in Norwegian engineering students which reported higher figure of Hypermetropia of 30%[32].

Conclusion

The study concludes that, the overall prevalence of refractive errors is more in USM-KLE medical students than compared to BIMS medical students with increased prevalence being more in females, which could be due to the ethnic variations and different genetic predispositions. The study also concludes that there is gender variation and ethnicity factor is also involved in the prevalence of refractive errors.

The prevalence of myopia is also more in USM-KLE students than that of BIMS students with female students having increased prevalence which could be due to the ethnic variations, genetic predispositions and higher level of education which is associated with near work activities and longer study periods in medical field.

Prevalence of Hypermetropia in BIMS and USM-KLE medical students was nil.

The prevalence of astigmatism was equal in both BIMS and USM-KLE students along with females being more affected than males because astigmatism is hereditary and varies widely between and within the racial groups.

The prevalence of Myopia with astigmatism was also more in USM-KLE medical students than that of BIMS medical students, along with females having more prevalence than males especially of USM-KLE females than that of BIMS females which could be due to the ethnic variations and genetic factors. One male USM-KLE student was found to have compound myopia with astigmatism.

In Asian studies we can see that over two decades the prevalence of myopia has increased in Indian medical students and it is coming close to results obtained from other Asian countries. Highest prevalence of myopia in medical students than compared to engineering and arts students supports the role of environmental changes like stress and time spent in full time education in myopisation. It has also emphasized and justified the saying "Deteriorating vision-an occupational hazard for medical students". This study produces a small insight of ongoing problem of refractive errors in students. Much work is still needed to assess on a larger scale to enable alterations of the environmental factors responsible for causing refractive errors for the betterment of generations[2]. It also urge for further investigative studies along specific lines that indicate the exact causes of increase in myopia and the actions to mitigate factors causing refractive errors.

Limitation

Further investigative studies are required along with specific lines which indicate the exact causes of increase in prevalence of refractive errors and the actions to mitigate factors causing refractive errors.

Recommendation

This study has thrown some light on distribution of refractive errors on student population which can be used for screening and has shown that education stream acts as an important factor in determining the type of refractive errors. Much work is still needed to asses on larger scale, alterations of environmental factors responsible for causing refractive errors for the betterment of generations.

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