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Original Article

Prevalence of Refractive Error among College Students in South India: A Pilot Study

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Abstract
Introduction: *Uncorrected refractive error contributes to the leading cause of moderate to severe visual impairment. Correction of refractive error in school children will make a dramatic improvement in educational potential and quality of life. We decided to screen college students to study the prevalence of the pattern of refractive error, look out for the newly detected cases and also see the effectiveness of school eye screening programme (SES).*
Materials and Methods: *A cross-sectional study was conducted in a Medical College. 193 randomly selected students, aged between 17 to 25 years were examined. Participant's demographic details and history regarding previous eye checkup, use of glasses, frequency of its change and its power were recorded. Uncorrected visual acuity (UCVA) and best corrected visual acuity (BCVA) were noted. The participants were subjected to non cycloplegic refraction. Refractive error measurements were recorded in sphere, negative cylinder, and cylinder axis format. In our study uncorrected refractive error was defined as people having vision 6/12 or worse, who could achieve a two line improvement in vision after refractive correction. Statistics were analysed using SPSS software version 20.*
Results: *69.4% (134) of the participants had refractive error. 66.3% (128) of participants were myopic, 3.1% (6) had astigmatism. Five participants (2.6%) had uncorrected refractive error.*
Conclusion: *Myopia is the most prevalent refractive error. Continuation of screening for refractive error during admissions in college can complement to SES to reduce the magnitude of uncorrected refractive error.*
Keywords: *Myopia, Uncorrected refractive error, college students.*

Introduction

Globally top causes of blindness include cataract, uncorrected refractive errors and glaucoma according to the International Agency for the Prevention of Blindness and WHO. Uncorrected refractive error contributes to the leading cause of moderate to severe visual impairment[1].If blindness was defined on the basis of presenting visual acuity, uncorrected refractive error would be the second largest cause of treatable blindness after cataract[2]. Based on a meta-analysis, approximately 116.3 million people had

uncorrected refractive error all over the world[1]. Uncorrected refractive errors pose a serious issue as this could hinder the individual from growth in various walks of life[3]. It is an economical burden to the family as well as to the nation. Correction of refractive error in school children will make a dramatic improvement in educational potential and quality of life. So National Programme for Control of Blindness (NPCB) included school eye screening (SES) program as its integral part since 1994[4]. We decided to screen the college students to study the prevalence of the pattern of refractive error. This study would also look out for the newly detected cases which might throw some light on the effectiveness of school screening programs.

Materials and Methods

After obtaining ethical committee clearance, we conducted a cross-sectional study in a medical college. 395 eyes of 193 randomly selected students were examined over a period of 6 months. They were aged between 17 to 25 years. Previous ocular trauma or ocular surgery was set as an exclusion criterion. Study was initiated after obtaining written informed consent. Participant's demographic details were collected. Brief history regarding previous eye checkup, use of glasses, frequency of its change and its power were recorded. Clinical evaluation included measurements of uncorrected visual acuity (UCVA), best corrected visual acuity (BCVA) using standard Snellen's visual acuity chart. Refractive error measurements were done using Nidek autorefractometry and retinoscopy. The students were subjected to non cycloplegic refraction. Refractive error measurements were recorded in sphere, negative cylinder, and cylinder axis format. 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 more 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. In our study uncorrected refractive error was defined as vision 6/12 or worse, who could achieve a two line improvement in vision after refractive correction. Statistical analysis was done using SPSS software version 20.

Results

Mean age of participants was 19.7 ± 1.21 years, ranging from 17 years to 25 years. 46.1% (89) of participants were males and 53.9% (104) of participants were females. 78.8 % (152) of participants had previous eye checkup and 21.2% (41) of participants did not have previous eye checkup (figure 1). 63.2% (122) of participants had been using glasses for refractive error and 36.8% (71) of participants was not using refractive glasses. 69.4% (134) of the participants had refractive error. 66.3% (128) of participants were myopic, 3.1%% (6) of participants had astigmatism and rest 30.6% (59) of participants were emmetropic (table 1). 6.2% (12) of participants used contact lens for refractive error (11) and cosmetic purpose (1). Out of 122 participants who were using glasses, 48.4% (59) of participants changed glasses every year, 17.2% (21) of participants changed glasses once in two years and rest 34.4% (42) of participants changed glasses every three years or more (figure 2).

12 participants (6.2%) were newly detected to have refractive error. Out of these 12 newly detected refractive error participants, 5 participants (2.6%) met the criteria for uncorrected refractive error.

SE of 134 patients having refractive error were calculated and grading of myopia was done (figure 3). 58.6% (75) participants had mild myopia, 33.6% (43) participants had moderate myopia and 7.8% (10) participants had severe myopia.

Table 1: Refractive error status of participants

Refractive error	Number of participants
Myopia	128
Astigmatism	6
Hypermetropia	0
Emmetropia	59

Figure 1: Percentage of participants who had previous eye examination

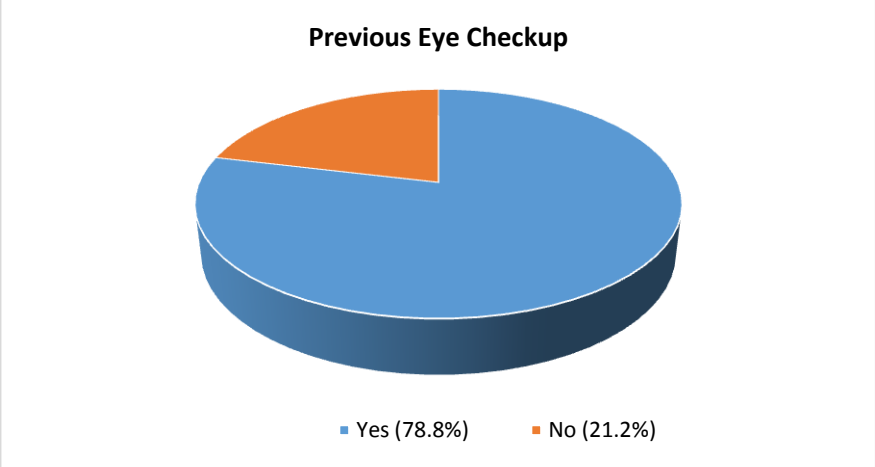


Figure 2: Frequency of change in glasses among participants who were using glasses

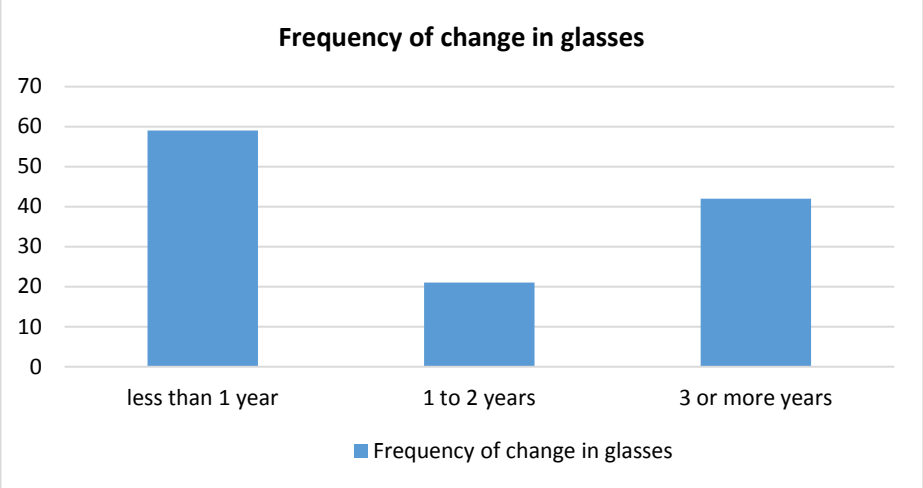
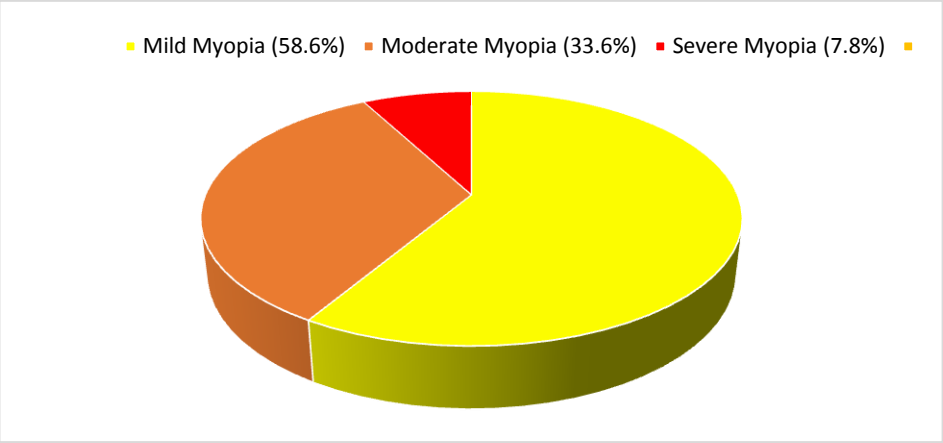


Figure 3: Grading of severity of myopia



Discussion

Uncorrected refractive error is a major concern and early detection and treatment can reduce the prevalence of visual impairment. Myopia is the most common refractive error. The prevalence of refractive error in our medical college was 69.4%. It was little more than the refractive error prevalence (58.7%) in Qassim Medical University with similar age of participants conducted by Sultan et al[5]. Similar results of myopia prevalence (56.9%) were brought out by AK Dey et al in his study conducted in Medical College in Eastern India[6].

Woo WW et al reports one of the highest prevalence rates of myopia (89.8%)amongst medical students in Singapore[7].

There is higher prevalence of myopia in younger age group with its prevalence rising in late teens and twenties[8]. In Williams et al[9] study, 25 to 29 years age group of population had peak prevalence of myopia, about 47.2%. In our study with age group of 17 to 25 years myopia prevalence was still higher (66.3%).In a recent study conducted in 2017 in a southern state of India, by T. Jyothirmai et al[10], the prevalence of myopia was found to be 70.7% in medical students in the same age group as our study and it correlated very well with our results.

Globally, 42% of moderate and severe visual impairment is found to be due to myopia and it also contributes to 3% of blindness worldwide[11]. Holden et al[12] estimated that the global prevalence of myopia will increase to 50% by 2050 from its current prevalence of 27% in 2010. The prevalence of high myopia (7.8%) in our study is greater when compared to prevalence of 2.7% globally.

122 participants (63.2%) were already using glasses at the time of our study. Out of these participants who were using glasses nearly half (48.4%) of them changed glasses every year. 34.4% of participants had changed their glasses 3 years back, signifying that refractive error has been stabilized for them. According to correction of myopia evaluation trial, the mean age of stabilization of refractive error was found to be 14.5 to 17 years[13].

Various strategies are being followed to control the progression of myopia. These include prescription of corrective spectacles[14], contact lenses[15,16], increasing the time spent in outdoor activities[17] and pharmacological control with agents like atropine[18]. Among all these prescription of corrective spectacles plays a major role.

For successful prescription of corrective spectacles, screening for refractive error was started for school going students of 10 to 15 years of age and integrated with NPCB from 1994.This SES is a boon as it creates awareness among teachers, students and parents. They help in early detection and treatment which in turn facilitates the growth of the child in various fields of activity. How far this initiative works, varies throughout the country and also depends on whether the parents procure the spectacles for the child and follow up regularly with the ophthalmologist. When meticulously done and followed, the school screening programme is definitely successful.

Padhye et al[19] studied the prevalence of uncorrected refractive error in 2004-2005 at rural and urban schools in Maharashtra and found it to be 2.63% and 5.46%. In our study in college students, the prevalence of refractive error was 2.6%. 21.2% of participants in our study did not have previous eye checkup. This could be the reason for uncorrected refractive error in 2.6% of participants. Though SES and awareness has brought down the prevalence of uncorrected refractive error, further strengthening of the program and creating more awareness among the public would definitely help bring down the prevalence. Basic vision screening could be initiated during the student admissions in college which would catch up with the missed screening at the school level. This could ensure that every child gets the opportunity of being screened and treated as and when necessary.

Conclusion

Correction of refractive error significantly increases the quality of life. Screening for refractive error in school children remains as the main strategy in early detection and treatment. Continuation of screening for refractive error during admissions in college can complement SES to reduce the magnitude of uncorrected refractive error.

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