MEDICAL SCIENCE

Assessment of the visual acuity among medical students who use the electronic devices during study 2022-2023

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ABSTRACT

Refractive errors, especially myopia, have been more common in recent years and are continuing to rise internationally. Information on the causes of vision decline provide a solid foundation for recommendations in public health policy, such as national budgeting and health-care planning, as well as scientific research. *Objective:* Our aim is to assess the relation between Visual acuity and time of studying on electronic devices among deferent academic level of the medical student. This study will be cross-sectional. The target population is medical students' males and females in Riyadh, KSA with a total sample of 253. *Methods:* A cross-sectional design was conducted; the study was based on a visual acuity examination and questionnaire that is prepared especially for it. The data was cleared, coded and entered by using (SPSS). *Result:* The study included 253 medical students who completed the visual examination and the study questionnaire in which 53.8 %were female and 46.2% were males mean age of participants was 22 years. We found that 32.42% of participant had 6/6 of visual acuity. *Conclusion:* The study concludes that there is association between visual acuity and the time spent on studying using electronic devices.

Keywords: Visual acuity, medical students, electronic devices, study, academic level

1. INTRODUCTION

Refractive errors are a condition in which the optics of the non-accommodating eye is unable to focus parallel light rays on the retina. Myopia (nearsightedness), hyperopia (farsightedness) and astigmatism can appear alone or in combination, such as myopic astigmatism and hyperopic astigmatism (WHO, 2018). Individuals and society are burdened by

uncorrected REs, which result in higher morbidity, economic suffering and less possibility for education and production (Balasopoulou et al., 2017). Understanding of the causes of eye sight loss is a valuable starting point for public health policy suggestions including such national budgeting and healthcare provision, as well as scientific research (Bourne et al., 2013). Refraction errors, especially myopia, have been more common in recent years and are continuing to rise internationally (Gilbert and Foster, 2001). For understudies in various parts of the world, poor eyesight is a key impediment to a sound and enlighteningly supporting school/college environment. Visual impedance due to uncorrected refractive errors is quite common among young adults and is the second most common cause of curable visual impairment (Abuallut et al., 2020). Our aim is to assess the relation between visual acuity and time of studying on learning tools among deferent academic level of the medical student. Visual impairment that can be measured simply by senile chart defined as a decreased ability to see things which is critical problem for health professionals and students to whom normal vision is essential for their daily activity. Visual impairment, if not treated promptly, causes medical, psychological and socioeconomic problems for individuals and the nation. On the other hand, medical student must study many hours by different methods such as tablets, phones and books. Our study aims to identify the relationship between visual acuity and different levels in medical school. We hypothesize that the higher academic level that student reach will have less visual acuity.

Objective

To assess the relation between visual acuity and time of studying on learning tools among deferent academic level of the medical student

2. METHODS

Cross-sectional study conducted at an institution in medical colleges, located in Riyadh city, capital of Saudi Arabia. Data was collected from September 2022-January 2023. The study population was medical students included medical students' males and females, excluded non-medical students and a known case of refractory errors. Sample size was 253, random sampling.

Data collection instrument

A pre-coded pre-tested questionnaire was done specifically for our study contains background questions (age, gender and faculty) in addition to other close ended question will be used to investigate the type of the tool and time of studying; also, participants will be examined for visual acuity using Snellen chart of letters (Cooke et al., 2019). Myopia was defined as a spherical equivalent refraction (SER) of less than 0.75 D, emmetropia as a SER of between 0.75 and 1 D and hyperopia as a SER of greater than 1 D. Low, moderate and severe myopia were all classified. Low myopia was defined as a SER of 0.75 to 2.99 D, moderate myopia was defined as a SER of 3.00 to 5.99 D and severe myopia was defined as a SER of 6.00 D. The diopter of cylinder was used to define astigmatism of 1.00 (Al-Rashidi et al., 2018). The data was analysed using SPSS (V 23) and Microsoft Excel to generate tables and charts. P value of ≤ 0.05 was considered significant.

Data collection methods

Interviewer administered and visual examination.

Ethical consideration

Consent will be obtained from participants before data collection emphasizing on confidentiality and the right participant to withdraw from the study at any point of time.

3. RESULTS

Demography of the sample

The study included a total of 253 medical students from level 3 to level 12. 46.2% of the study participants were male subjects while 53.8 %were female subjects. 23.5 % of the participants were within age group 18-20 years, 54% within 21-23 years, 19.5% within 24-26 year and 2.8% were more than 26 years.

Table 1 Statistical frequency of the participant response

Age	Frequency	Percent
18-20	60	23.7
21-23	137	54.2
24-26	49	19.4
More than 26	7	2.8
Gender	Frequency	Percent
Female	136	53.8
Male	117	46.2
Current Level	Frequency	Percent
Level 3	34	13.4
Level4	45	17.8
Level 5	12	4.7
Level 6	22	8.7
Level 7	14	5.5
Level 8	39	15.4
Level 9	20	7.9
Level 10	27	10.7
Level 11	22	8.7
Level 12	18	7.1
Hours of Studying Per Day	Frequency	Percent
1-2 hours	30	11.9
3-4 hours	111	43.9
5-6 hours	74	29.2
More than 6 hours	38	15.0
Electronic Devices on Breaks	Frequency	Percent
Yes	239	94.5
No	14	5.5
Visual acuity	Frequency	Percent
Emmetropic	82	32.4
Myopic	171	67.6

Table 2 Association of hours of studying by electronic devices and the relation of eye abnormalities

		Emmetropic	Myopic	Total
Hours	1-2 hours	17	13	30
	3-4 hours	29	82	111
	5-6 hours	24	50	74
	More than 6 hours	12	26	38
Total		82	171	253

P value = 0.018

Table 2 shows most of the participants (171) 67.58% who use electronic devices in studying are suffering from myopia this goes in hand that increasing the hours of studying which was significant with a P value of 0.018 (Figure 1 & Table 2).

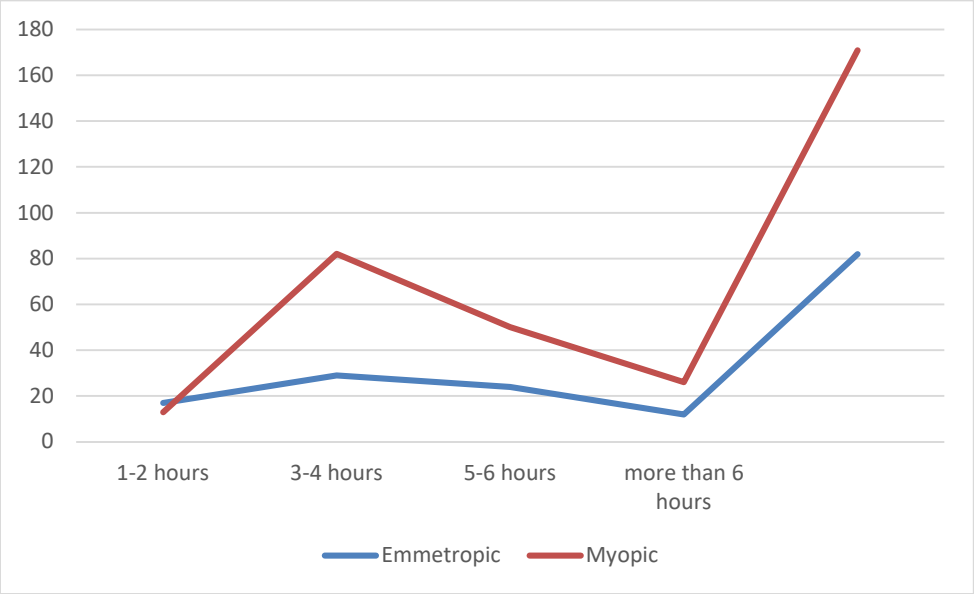

Figure 1 Association of hours of studying by electronic devices and the relation of eye abnormalities

This Figure 2 shows the frequency of eye symptoms experienced by participants using electronic devices during studying.

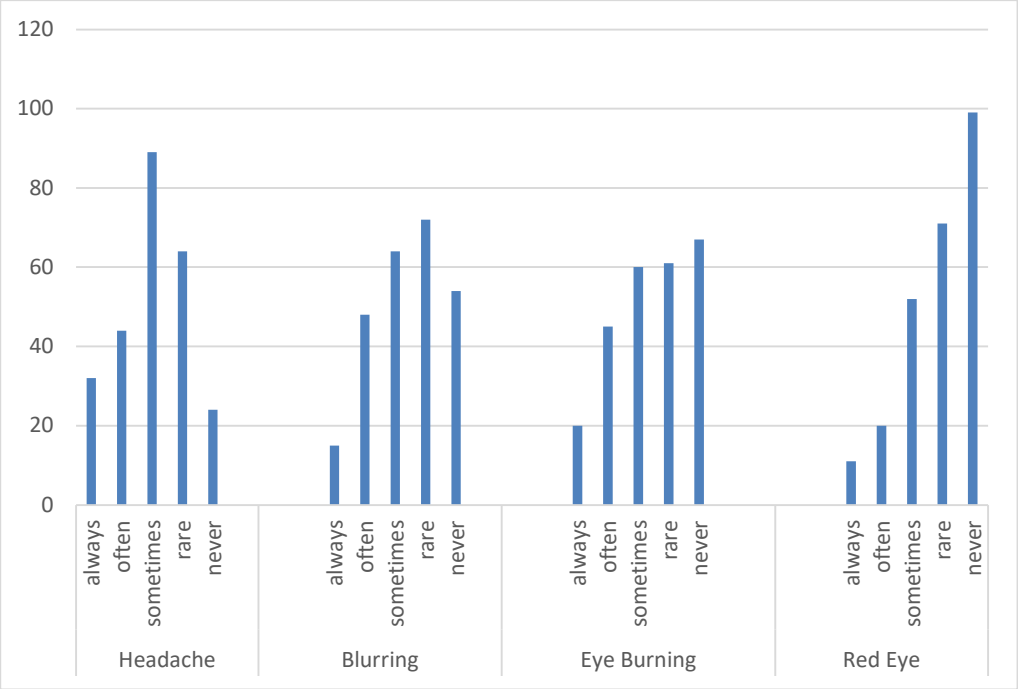

Figure 2 Frequency of eye symptoms

Table 3 Comparison of experiencing red eye symptom compared to hours of studying

Red eye during studying						Total
	Always	Often	Sometimes	Rare	Never	
1-2 hours	0	4	6	7	13	30
3-4 hours	4	4	17	32	54	111
5-6 hours	3	9	16	22	24	74
More than 6 hours	4	3	13	10	8	38
Total	11	20	52	71	99	253

P value =0.034

Table 3 showed the data analysis of the participant for statistically significant associations with their experiencing red eye symptom and hours of studying. Surprisingly, the analysis findings suggested that statistically significant association was found between experiencing red eye symptom and hours of studying p = 0.034 (Figure 3 & Table 3).

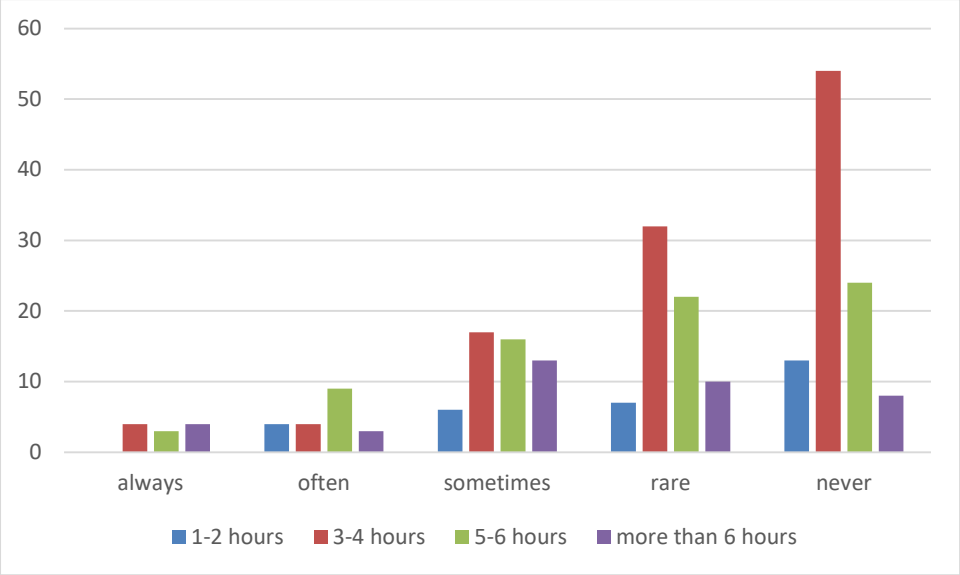

Figure 3 Red eye

Table 4 Association of hours of sleeping and the relation of eye abnormalities

Sleeping hours	Emmetropic	Myopic	Total
4 hours or less	1	16	17
5 hours	13	26	39
6 hours	13	50	63
7 hours	29	44	73
8 hours or more	26	35	61
Total	82	171	253

P value =0.007

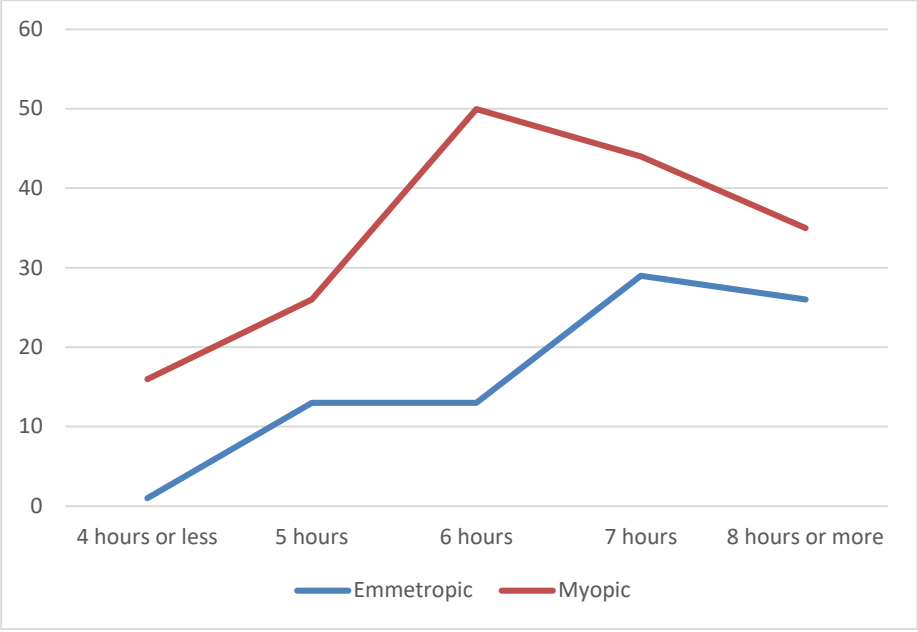

Figure 4 Association of hours of sleeping and the relation of eye abnormalities

Table 4 showed the data analysis of the participant for statistically significant associations with their hours of sleeping and eye abnormalities. Surprisingly, the analysis findings suggested that statistically significant association was found between hours of sleeping and eye abnormalities p = 0.007. Witch we can see that decreasing in hours of sleeping increase the incidence of eye abnormalities (Figure 4 & Table 4).

4. DISCUSSION

The current study was conducted to assess the visual acuity among medical students who use the electronic devices during study, showed that most of the participants have association with abnormal visual acuity and the time the spent during studying on their electronic devices, this goes in hand with study by Alamri et al., (2022) in Saudi Arabia. This implies that majority of students are using their electronic devices within unaccepted ranges that will affect their visual acuity in the future. Our study shows that, using electronic devices affects visual acuity which goes with study by Mahar et al., (2021) in Pakistan. In that case we should educate the students about the complications of using the electronic devices on excessive way, even if our questioner shows mild symptoms of the long-term use, these mild symptoms can be worse with time. Our study shows that studying using electronic devices does affect the visual acuity level. This goes in line with a study done by Kumar et al., (2018) in India. This implies that the research community should further investigate the relation between electronic devices and studying hours and their effect on visual acuity. Our research show that the most experienced symptom of prolonged screen exposure is eye burning and headache. This go with research done by Long et al., (2017) were they used a survey related to the eye strain this was given to them before and after using their phones for 60 minutes, all participants had the same experimental circumstances from phone distance even to the type of smartphone. What they found was interesting, the participants had already mentioned that they are in a good health and normal visual acuity. The viewing measurements were approximately 30 cm for 60 minutes, this viewing distance kept changing during the cycles of this 60 minutes, the importance of this on the survey of the eye symptoms showed that the post-experiment score was double the pre-experimental score which included the symptoms of tired eyes, blur and uncomfortable eyes were significantly increased. They believe that as closer the distance of your smartphone to your eyes the higher chance of you getting eye strain.

Recommendation

Students should be aware of the negative effects of prolonged use of video display devices on their eyes. If possible, students should limit their computer/mobile use to no more than 4 hours per day. And if it is necessary to use a computer/mobile for an extended period during the day, preventive measures must be implemented on a continuous basis. Continuous use of display devices should be avoided if students have other ocular problems, such as myopia. We recommend ministry of health and also ministry of higher education to do an eye screening for all medical students every 1 to 2 years for evaluating their visual acuity and to do eye examination for new registered medical students and then do it annually to see their eye condition after using electronic devices.

5. CONCLUSION

The conclusion that can be drawn from the results we have obtained in assessment of the visual acuity among medical students, who use the electronic devices during study, is that there is association between visual acuity and the time spent in studying using electronic devices. Genetic, environmental and occupational influences may play an important role. More vision screenings are required at a large scale on medical student population to reflect the real situation on the ground. Cost-effective strategies are needed to address this easily treatable cause of vision impairment.

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Ethical consideration

Ethical approval from the Institutional review board (IRB) of Almaarefa University College of Medicine (Ethical approval code: IRB23-012) was met before data collection began and the purpose of the study was clearly explained to the participants. They are assured that data from this study will be used for scientific purposes only, that ethical concerns and legal issues was considered and that participation is completely voluntary.

Authors' contribution

All authors had substantial contribution to the paper.

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This study has not received any external funding.

Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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