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Digital smart devices and ophthalmic health among medical students in Baghdad

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Abstract

Background: While Digital smart devices have become a requisite engine for a great wealth of information, services, and communication, the improper and excessive use of smart devices can affect ocular health negatively. The influence on ocular health is predominantly relevant to medical students, who regularly depend heavily on these devices for their academic purposes.

Objective: To identify the prevalence of smart device over usage, among a sample of medical students in Al-Mustansiriya University. And to highlight its drawbacks on their ocular health with respect to visual acuity and certain eye problems.

Methods: A cross-sectional study was conducted from January through February 2024. A Convenient sample of 500 students was chosen from three medical colleges of Al-Mustansiriya University. A self-administered structured questionnaire form was used for data collection.

Results: More than 75% of our sample spends 4 hours a day on digital devices. Above one-half of them had various refractory errors, and the prevalence was slightly higher in males. Myopia was the highest type (33.2%). A higher significant proportion of students with myopia had a negative family history of visual acuity (34.4%, p-value=0.001). Fifty-three percent of the sample students, their refractory errors, started at least 2 years of excessive usage of smart devices. The double, blurred vision, dryness, itching, and eye redness were common ophthalmic problems. The study concluded that extensive screen time is a risk factor for various refractory errors and other ophthalmic symptoms among medical students. And suggesting that the visual acuity errors are a complex interaction of genetic predisposition with extrinsic environmental influences. That recommended furthermore inclusive prospective studies to prove that.

Keywords: Refractory errors, smart digital devices, ophthalmic symptoms, ocular health, eye problems

Introduction

Advanced technologies embodied in digital smart devices such as tablets, computers, and smartphones, have become a requisite engine for a great wealth of information, services, and communications. That reduces the boundaries of time and space. Nevertheless, screen stare time raises worries towards the various adverse health effects, especially ophthalmic health^[1]. Over time, Smart devices have evolved into vital instruments for medical education, facilitation of clinical practice, stimulating an active learning environment and providing direct access to the more up-to-date sources of educational settings. While people are dependent on smart devices, and this dependency is likely to continue moving forward, the improper and excessive use of smart devices can affect health negatively, especially ocular health^[2]. Computer Vision Syndrome (CVS) is one of the conditions allied with extended stare to electronic devices, which causes a range of ocular symptoms such as dry eyes, eyestrain, and blurred vision, in addition to other health sequelae^[3]. Dry eye disease (DED) is the most recurrently encountered ocular illness worldwide, affecting about 5% to 50% of people^[4]. It is characterized by stinging, scratching with a foreign body sensation, watery eyes, and eye fatigue. With the prolonged focusing and an abridged blink rate than normal, besides the exposure to blue light of screens, all this results in deficient tear secretion^[3,5]. On the other hand, refractive errors (REs) such as Myopia (Nearsightedness), Hyperopia (Farsightedness), and Astigmatism (Defect of light focusing). All are other challenges that continue to upgrade overseas and have become the commonest visual impairment and the second leading cause of preventable blindness^[6]. The everyday use of electronic devices exacerbates these issues of the ametropic eye and raises concerns about the hazards of these devices on eye health^[7].

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The influence of various electronic devices on ocular health is predominantly relevant to medical students, who regularly depend heavily on these devices for their academic purposes. That might render them particularly susceptible to numerous eye problems [5]. This study was designed to identify the prevalence of smart device overuse, among a sample of medical students at Al-Mustansiriyah University. And its drawbacks on their ocular health with respect to visual acuity and other eye problems.

Method

A cross-sectional study was conducted from January through February 2024. A Convenient sample of 500 students who have been pursuing the second, third, fourth, and fifth stages, and are willing to participate, were chosen from three medical colleges: the Medicine, Pharmacy, and Dentistry of Al-Mustansiriyah University. Self-administered structured, anonymous questionnaire form, was specially designed for research purposes. The questionnaire encompassed 3 domains: Demographic characteristics, and information about electronic device usage. The time of daily use (number of hours/day). In addition to the effects of electronic device usage on the visual acuity of students, and certain ophthalmic symptoms that may occur after a continuous use of these devices for more than an hour, within the last two months. Ophthalmic symptoms were chosen according to previous studies. The ethical committee

at the Department of Family and Community Medicine/College of Medicine/AL-Mustansiriyah University has given its implicit approval for the research conduction. A brief of the research purpose and objectives were explained to all students who agreed to participate in this study. Additionally, they were given adequate privacy and sufficient time to complete the questionnaires.

Data entry and data analysis have been performed, using Statistical Packages for Social Sciences [SPSS] version 21. Descriptive statistics of the sample characteristics were conducted using numbers and percentages. Inferential statistics have also been conducted by using chi-square to address association. A p-value of ≤ 0.05 is indicative of statistical significance.

Results

A total of 500 college students were involved in the current study, 69% of them were female. Medical students formed 59.6% of the sample, pharmacy (27.8%), and dentistry (12.6%). The largest group was in the second academic year (30%), and the smallest was the fifth-year group (10%). The same table 1 shows that more than three-quarters of our sample spend ≥ 4 hours a day on digital devices. Moreover, 48% of them had normal visual acuity, while myopia was found among 33.2% of the sample, astigmatism and hyperopia were in 14.6%, and 4.2% of the sample respectively. Table (1).

Table 1: General characteristics of the study sample.

Characteristic	Point A	No.(n=500)	%
Gender	Male	155	31%
	female	345	69%
Age		21.18 (±2.42)	
Colleges	Medicine	298	59.6%
	Pharmacy	139	27.8%
	Dentistry	63	12.6%
Academic year	1st	75	15%
	2 nd	150	30%
	3 rd	125	25%
	4 th	100	20%
	5 th	50	10%
Time of Using	<4 hours	120	24%
	≥ 4 hours	380	76%
Visual Acuity	Normal	240	48%
	Hyperopia	21	4.2%
	Myopia	166	33.2%
	Astigmatism	73	14.6%

Table (2) illustrates that the prevalence of various REs among the study sample was 52%, with a slightly higher prevalence in males (54.1%) compared to females (51%). In

addition, around a quarter of the participants (24.2%) had a family history of refractive errors.

Table 2: Prevalence of refractory errors in the study sample

Characteristics	RE/T	Prevalence
Refractive Errors	260/500	52%
RE among male	84/155	54.1%
RE among female	176/345	51%
+ve FH of RE	121/500	24.2%

Table 3 depicts that students with normal visual acuity spend less than 4 hours per day using smart devices. Whereas medical students with REs particularly, myopia and astigmatism, who spend a higher time of daily usage of

smart devices, of four or more hours/day (35% and 17%), were significantly higher than those who stare at smart device screens for less than 4 hours a day (27.5%, 6.7%, P-value=0.002).

Table 3: Visual acuity according to the time of daily usage of smart devices.

Visual acuity	Average daily usage (n=500)				P-value
	< 4 hours (n=120)	%	≥ 4 hours (n=380)	%	
Normal	73	60.8	167	43.9	0.002*
Hyperopia	6	5	15	4	
Myopia	33	27.5	133	35	
Astigmatism	8	6.7	65	17.1	

*Pearson Chi-square test.

Positive family history of visual acuity defects was significantly higher among students with normal vision (39.7%). Furthermore, a higher significant proportion of those with myopia had a negative family history of visual

acuity (34.4%, p-value=0.001) (Table 4). Besides that, 53% of the sample students with various REs, their problems started at least 2 years from starting to use smart devices (not tabulated).

Table 4: Visual acuity according to family history of visual impairment among the study sample.

Visual acuity	Yes (n=131)	%	No (n=369)	%	P-value
Normal	240	52	188	50.9	0.001*
Hyperopia	21	9	12	3.3	
Myopia	166	39	127	34.4	
Astigmatism	73	31	42	11.4	

*Pearson Chi-square test.

Table 5 suggests that double and blurred vision were the highest prevalent ophthalmic symptoms (58% and 40.6%), among medical students while staring at smart device screens. Dryness seen among 34% of the sample, while itching and redness both were the least (17%). The same

table 5 depicts that, all these ophthalmic symptoms, were significantly greater among those exposed to smart device screens for ≥4 hours daily, than other students who were exposed for a shorter period, with p-values ranging between 0.001 and 0.026.

Table 5: Eye problems according to time of daily usage of smart devices.

Eye problems	<4 hours n= 120 N	%	≥ 4 hours n= 380 N	%	Total n= 500 N	%	p-value
Dryness	22	18.3	152	40	174	34.8	0.0001*
Blurred vision	26	21.7	177	46.6	203	40.6	0.0001*
Double Vision	47	39.2	243	63.9	290	58	0.0001*
Itching	12	10	75	19.7	87	17.4	0.014*
Redness	13	10.8	75	19.7	88	17.6	0.026*

*Pearson Chi-square test.

** There is overlapping in no. since most students have more than one eye problem

Discussion

The present study provides an updated overview of the impact of digital smart devices overuse on eye health, focusing on medical students. The study demonstrated that the prevalence of medical students who suffered from various REs was 52%, such a significant figure was in line with what was observed in Saudi Arabian medical students, where the prevalence was 53.7% in 2018 [8]. However, it was lower than that of medical college students who studied in India, where it was 68%, as reported by Kshatri *et al.*, in 2016 [9]. Upon these REs, Myopia was the top concern in our study sample, as one-third of the respondents were suffering from it. The problem was more noticeable in Saudi Arabia, in a recent study done by Alotaibi *et al.*, in 2022 who conducted a descriptive cross-sectional study targeting 1428 students at a medical college, and stated that the prolonged utilization of smart devices was linked with a myopia progression in 48.7% of the sample. Additionally, this study demonstrated that the rates of REs, especially myopia, and astigmatism increased significantly with increasing time spent in front of these devices P=0.002 [10]. All these figures are expected, since a long presence and continuous viewing at the smart device screens, for ≥4 hours a day, was prevalent among 76% of our study sample. That is besides the high academic load and near-work activities of the medical students. The analogous association was demonstrated by a review of 33 articles, meta-analysis

study, investigating smart device usage time versus myopia development among children and young adults in 2021. [11] Similarly, a study by Do *et al.* in 2020, that conducted in China on primary school students, suggested that prolonged use of electronic devices can have detrimental effects on visual health [12]. The study showed that, the overall prevalence of REs was slightly higher among males, although the female sample was predominant (69%), as is their representation among college students. The opposite was in China where, a study that included 3138 primary and secondary students, to investigate a gender difference in myopia, females were slightly more likely than males to be myopic [13]. Although a positive family history of REs was observed in 24% of our sample students, the percentages of REs were significantly higher among students with a negative history. Besides that, 53% of our respondents reported that, their visual problems began at least 2 years after the smart device usage. This indicates that students’ myopia might be driven more by environmental factors, than genetics. Another study done recently in Spain in 2023, corroborates our finding, where it was declared that, the occurrence of myopia is attributed to a gene-environment interaction [14]. At the same time, Kalita *et al.* through their retrospective hospital-based data study, in India, found that 57.33% of children with REs have a positive family history and reported a strong association of family history with refractive errors [15]. This

proved that myopia has a complex interaction between genetics with intrinsic and extrinsic environmental factors. Such interactions are important for designing sensitive prevention and treatment approaches.

This study also verified significant rates of various ophthalmic symptoms, among medical students while staring at smart screens for \geq an hour. Especially double vision (58%) and blurred vision (40.6%) as well as dryness, itching, and redness of the eyes (P-values of 0.001 to 0.02). These figures were in congruence with a previous study conducted in Russia, where 75% of students who used smart devices, in a long form were complained of, double and blurred vision [16]. Correspondingly, many recent studies revealed a statistical significant association between prolonged usage of smart screens with the symptoms of dryness, redness, and itching of the eyes [17-19] that definitely has detrimental future impacts on the eyes of such young people.

Conclusion

The study concluded that extensive screen time is a risk factor for various REs, and other ophthalmic symptoms among medical students. And suggesting that, such errors are a complex interaction of genetic predisposition with extrinsic environmental influences. All, necessitate to upgrade awareness of medical students, about the excessive usage of such devices and the effective steps to protect their ophthalmic health. And recommended, furthermore prospective studies to prove that.

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Conflict of interest

Not available.

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