

Duration of Daily Digital Screen Time during Covid-19 and Its Ocular Impact on Children in Pakistan

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Abstract

Study Objective: To determine the duration of average daily screen time during the last 3 months of COVID-19 and its ocular impact on children all over Pakistan.

Method: A prospective and Cross-sectional online survey conducted from March to May, 2021 included parents of children between 2 and 16 years of age with an internet access. A self-designed questionnaire on Google forms was sent online to see the average daily screen time and frequency of ocular symptoms among their children during COVID-19.

Results: A total of 378 participants were selected by snowball sampling technique. Females were 200 (53%) and male children were 178(47%). Children between 7-11 years of age group were 159 (42%). The majority of children spent 5- 7 hours and 8 – 10 hours on screen per day in the last 3 months of covid-19 i.e. 48% and 30% respectively. Children utilized digital electronic gadgets for multiple purposes were 268 (71%). Children complain of blur vision was 26% and red eye was 6% most of the time. Furthermore, 31 % had complained of eye pain occasionally and 14%, most of time. Headache, watering, photophobia, foreign body sensation and double vision were also notified by 5%, 4%, 1%, 4% and 2% of children respectively.

Conclusion: The Duration of average daily screen time in our country is more than 5 hours per day during COVID-19. Blur vision and eye pain are the most common symptoms experienced by children.

Keywords: COVID-19 • Pakistan • Screen time • Electronic gadget

Introduction

Media and digital devices are an integral part of the world today. Despite potential advantages of media time, excessive or inappropriate use of technology is having a significant impact on overall health of the children [1]. Digital Electronic Gadgets are the electronic devices with a screen that use digital signals to work & emit radiations through the screens [2]. Recent example of digital electronic devices includes television, mobile phones, laptops, computers & tablets. Screen time is the amount of time spent on digital electronic gadgets with a screen [3,4]. Electronic gadgets emit a shorter wavelength of light called as Blue Light, which is artificially generated. Natural blue light source includes sun. Blue light from sun carries 450 to 500nm of wavelength, while artificial blue light has 380-450 nm wavelengths; hence more energy stores in artificial blue

light due to shorter wavelength and therefore causes more damage than other forms of light, if exposed for a longer duration. ² Several studies show a high number of asthenopia among people of different age groups using excessive digital electronic device(s). Asthenopia (Eye-strain) is a general term use to describe somatic or perceptive symptoms that includes headache, pain in eyes, redness of eyes, watering of eyes, diplopia, blur vision, photophobia, dry eyes & foreign body sensation [5]. Many research consider the presence of at least one of these symptoms as asthenopia (eye-strain) [6]. Researchers have found that prolonged exposure to artificial blue light via electronic gadget scan generate poisonous molecules in light-sensitive cells of retina and damage macula; both of which affect vision, produce asthenopic symptoms and can cause blindness [7]. In an investigation in USA in 2011, over, 2000 American children between 8 and 18 years showed they spend time on entertainment media is approximately 7.5 hours. On an average day, 4.5 hours watching television, 1.5 hours on computers and over an hour on playing video games [8]. In a recent online survey conducted in USA, 15.1% children are found to spend more than 4 hours per day on their smartphones only while 26.9% spend 3-4 hours per day [9]. In United Kingdom, children of various age groups spend 23 hours per week using electronic gadgets that makes 3.2 hours per day [10]. Another study in United Kingdom shows that 37% children use electronic gadgets 1 to 2 hours per day, while 28% nearly 3 to 4 hours per day [11]. Due to the possible hazardous impact on eyes and other human aspects, a guide line is issued from the Canadian Society for exercise physiology, on recreational screen time that it should not be more than 2 hours per day for children and youth (5 to 17 years), no more than 1 hour for preschoolers (3-4 years) and older toddlers (2-3 years), and young toddlers and infants of less than 2 years should avoid using all kind of screens [12]. Also, health care researchers have restricted the electronic gadget screen time of children below 14 years to less than 2 hours per day, that too when necessary, and strictly recommends no electronic gadget exposure at all to children below 5 years of age [13].

COVID-19 has altered the perspective of the entire world. It has affected individuals belonging to every walk of life. Everyone is bound and now accustomed to stay at home, work from home, online shopping, socializing virtually and patients settle for tele medicines. Children have also been forced to online education, spending leisure time in front of television screen, online gaming, reading online books and befriending on various social groups. The main purpose of this study is to determine the average daily screen-time of digital electronic gadgets among children for last 3 month during COVID-19 lock down 2020 in our country. The secondary objective is to see the frequency of ocular symptoms in children with increased screen-time during the same time frame.

Material and Methods

This is a prospective and descriptive cross-sectional survey, conducted online in the Ophthalmology department of Baqai Medical University and Karachi Medical and Dental College from March to May, 2021. Study was initiated after approval from the Institutional Ethics committee of Baqai Medical University and it adheres to the tenets of declaration of Helsinki. Sample size was 378, using Raosoft sample size calculator with 5% margin of error, 95% of confidence interval, 20000 population size and 50% response distribution. The Parents residing in Pakistan, having a child or children more than 2 years and less than 16 years of age with an online access and an electronic gadget were included in the study.

Parents who had fulfilled the inclusion criteria but refused to participate were excluded from the study. The participation and completion of the survey was regarded as the informed consent. Data was collected by snow ball sampling technique. A self-designed questionnaire in the English language was used on Google forms to collect the data and it was shared with the participants through email and what's app link. The responses had been accepted for 3 months. The name of the participants had been kept anonymous. Incomplete forms were excluded from the analysis.

Study questionnaire

There were a total of 19 multiple choice questions in this questionnaire. First three questions were about the demographic details of the children including age, gender and schooling. Children between 2 to 3 years of age usually don't go to the school, 3 to 5 years of age go to kindergarten, class 1 to 5 is primary education, 6 to 9 is middle, class 10 is matriculation and next two years is intermediate education in our country.

Next 16 questions were related to screen time and associated symptoms. Among them, 1 question was related to refractive error, whether participant child wear glasses or not. Four questions were about the duration of screen time, change in screen time over last 3 months, various types of gadgets used and the purpose they were used during Coivd-19 by their kids. The rest of the questions were about the symptoms developed during the last 3 months of Covid-19 including blurring of vision, pain, headache, redness, watering, intolerance to light, dry eye, foreign body sensation, and double vision. The last question was about the awareness of a parent about the consequences of excessive use of digital electronic devices. Data was analyzed on Microsoft Excel. Frequencies were generated for the categorical variables and means with standard deviation (SD) for numerical variables.

Results

The questionnaire was filled out online by 378 parents of the children ranging in age from 2 years to 16 years of age. Mean ages of the children were 10.32 ± 5.32 SD. In this study male children were 178 (47%) and females were 200 (53%). Of the children in various age groups, the most were in the 7-11 years of age i.e. 159 (42%) and then in 12-16 years of age groups i.e 113 (30%) respectively. Children studying in primary school were 98 (26%) and in matriculation were 83 (22%). Spectacles were worn by 41 (10.84%) children. Other dempgraphic details of the children are given in Table 1.

Screens of the electronic gadgets were engaged for 8- 10 hours by 12 (3%) of the children before pandemic lockdown and 113 (30%) after Pandemic lockdown. Screen was seen for 5-7 hours by 151(40%) of the children before Pandemic lockdown and 181(48%) after lock down. Duration of the screen time of the children during and before pandemic lockdown is given in Table 2. Electronic gadgets were used for educational purpose by 18% of the children. Most commonly it was used for multiple purpose i.e by 71% of the children. Details of other purposes of screen time are given in Table 3.

The children experienced various ocular symptoms during pandemic lockdown including decreased vision, eye pain, headaches, red eye, watering, photophobia and, etc. The majority of children complained of intermittent eye pain and blurry vision. Blur vision and eye pain was experienced by 25% and 14% of the children most of the time. Blur vision and eye pain was experienced occasionally by 31% and 26% of the children respectively. The parents who had no idea of the ocular symptoms, as their children were too young to complain were 17%. Table 3 shows the percentages for these symptoms during the last 3 months.

Table1: Demographic features of the participants in percentages.

Variables	N (%)
Age	
2-6 years	106 (28%)
7-11years	159 (42%)
12-16 years	113 (30%)
Gender	
Male	178 (47%)
Female	200 (53%)
Qualifications	
No school age	57(15%)
Madrasah (religious school)	15(4%)
Kindergarten	49(13%)
Primary	98(26%)
Middle	98(26%)
Matriculation	83(22%)
Intermediate	8(2%)
Wear spectacles	41 (10.84%)
Awareness of parent	67 (17.72%)

Table 2: Time spent on electronic gadgets before and after pandemic lockdown 2021.

Child spent time on electronic gadgets	Before pandemic lock down	In last 3 months after pandemic lock down
Less than 2 hours	113 (30%)	9 (2%)
2-4 hours per day	102 (27%)	45 (12%)
5-7 hours per day	151(40%)	181(48%)
8-10 hours per day	12 (3%)	113 (30%)
More than 10 hours per day	0 (0%)	30 (8%)

Table 3: The Percentage distribution of various ocular symptoms in last 3 months during pandemic lock down.

Symptoms	Yes, most of the time	Yes, but occasionally	Not at all	No idea, child is too young to complain
Blur vision	94(25%)	98 (26%)	122(32%)	64(17%)
Eye pain	53(14%)	117(31%)	144(38%)	64(17%)
Headache	19(5%)	27(7%)	268(71%)	64(17%)
Red eye	42(11%)	23(6%)	249(66%)	64(17%)
watering	15(4%)	34(9%)	265(70%)	64(17%)
Photophobia	4(1%)	8(2%)	302(80%)	64(17%)
Foreign body sensation	15(4%)	12(3%)	287(76%)	64(17%)
Double vision	8(2%)	26(7%)	280(74%)	64(17%)

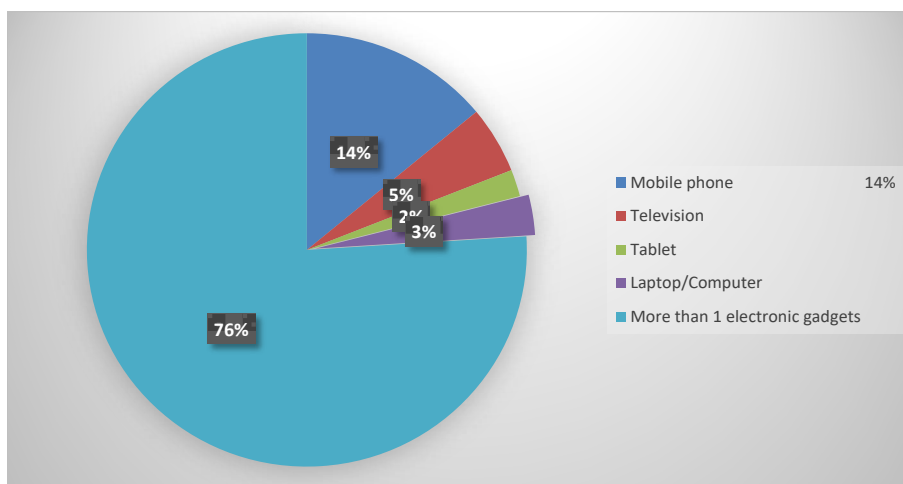


Figure 1: The electronic gadgets used by the children during last 3 months of pandemic lockdown.

Table 4: Percentage distribution for the purpose of daily screen time of digital electronic gadgets after pandemic lockdown.

Purpose of screen time	N (%)
Social media	11 (03%)
Online education only	68 (18%)
Movies/ cartoons	04 (01%)
Online games	27 (07%)
Multiple	268 (71%)

Screen of the smart phone was used by 14% of the children and 76% of the children used more than one electronic gadget (Figure 1). Other form of the screen used by the children is given in the Table 4.

Discussion

COVID-19 lockdown has made almost 90% of the students physically cut off from their school. Technology has become vital for them not only to interact with each other and accessing educational material but most importantly to play [14]. The screen time of children in our study was less than 5 hours in 57% of the total before Covid-19. After the Covid-19 lock down 86% of children has screen time of more than 5 hours per day. Amna gill et al, conducted a study on medical students, and had reported screen time of 4-8 hours in 47.37% and more than 8 hours in 39.5% of the students [15]. A study conducted on Indian students has reported a screen time of more than 5 hours per day from 1.8% to 36.9%, before and after COVID-19 lock down [16]. Even before COVID-19 lock down, a study conducted in the United States concluded that the screen time used by children of less than 2 years was about 3 hours, 5 hours for 8 to 12 years old and more than 7 hours for children between 13 to 18 years old [17,18]. White children used to spend 3 hours per day before COVID-19 and it has escalated to 6 hours per day on average [19]. Badri et al has reported an average screen time of students spent on social media is more than 5 hours per day [20].

The majority of respondents i.e 71% of the children in our study utilized digital technology for multiple purposes including access to educational material, social media and gaming. More than one electronic gadget was used by 76% of the students in our study. Study conducted by Niazi et al has reported 73.8% of students viewed television screen for entertainment purpose [21]. Mohan et al has reported 96.3% of students took online classes and 20.3% of them used multiple devices for screen time [16]. Shepard et al has reported 87% of individuals use more than 2 electronic devices for multiple tasks [22]. Excessive surfing on social media makes children vulnerable to cyber bullying, preys to online predators and exposed to the harmful content [23].

In the last 3 months of pandemic lockdown, children in this study complained of various ocular symptoms including blurring of vision, eye pain, and headache, redness of eyes, watering, and photophobia. The major complaint was blurring of vision (25%), eye pain (14%) and red eye (11%) most of the time among children. The most frequent symptom reported by the students in a study by Mohan et al were headache and itching (53.9%) [16]. Headache was reported in 53.3% and burning sensation in 54.8% of children by Shantkumari et al. [24]. Headache was reported by 51.75% and fatigue by 66.75 % of the medical students [15]. Significant numbers of children in our study were too young to complain about symptoms (17%). Prolong use of digital devices causing ocular problems specifically headache, burning sensation, blurry vision, dry eye,

itching, watering and red eye is collectively labeled as digital eye strain [22]. Prevalence of digital eye strain was 50.23% and 11.1% was graded as severe among students in a study by Mohan et al conducted in the ongoing Pandemic. ¹⁶ Prevalence of digital eye strain among children was 19.7% among Brazilian children [25]. Digital eye strain was associated with more than 5 hours per day use of digital screen, male gender and smart phone users [16].

There is an increased risk of developing myopia in children aged 5 to 7 years of age, spending more time in front of electronic gadgets and decreased outdoor activity [26]. Ocular surface disease causing dry eye associated with increased screen time has emerged as a global ocular problem. Viewing screens of electronic gadgets decrease blink rate. However smart phone users are more commonly associated with dry eye disease as compared to other electronic gadgets [27].

The use of mobile, laptop, tablet and other electronic gadgets will continue to increase not only among adults but for children also, to work, learn and socialize even after the pandemic is over. It is a combined responsibility of an ophthalmologist and general practitioner to educate parents about limiting digital screen time and increasing outdoor activity of children. Parents should supervise children during online activities and it should be strictly used for education rather than entertainment. It is also advisable to take frequent breaks at regular intervals, blink frequently and viewing distance of 25 inches for a smart phone. Other than these, children should have a regular eye checkup, healthy diet and adequate sleep.

There are few limitations of the study. The screen time of the children was not objectively measured but it was based on recall. Strength of the study is its sample size and the only one from this country representing children. Future studies should be carried out to examine ocular surface disease in children using excessive electronic gadgets.

Conclusion

The average daily screen time in the children of our country is more than 5 hours per day during Pandemic lock down. Blur vision and eye pain are the most frequent symptom experienced by children. Screens of multiple electronic gadgets are used for multiple purposes by children.

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