PREVALENCE OF COMPUTER VISION SYNDROME IN SCHOOL GOING CHILDREN DURING COVID ERA

Abstract

Background: Prolonged use of gadgets poses a significant risk of Computer vision syndrome (CVS). Computer Vision syndrome is emerging as the next unexpected epidemic of the COVID era. Almost all children attending regular online schools are suffering from mild to severe Computer vision syndrome. Besides health problems, CVS also results in concentrate difficulties in studies and decrease a child's performance. Awareness regarding CVS is increasing among folks of all ages since it has hit not just school going children but their parents as well who are pursuing work from home. Increasing number of cases of CVS have been reported since lockdown in our clinics and it is anticipated that it will eventually affect majority of the world's population, if we don't limit our gadget usage.

Material and Methods: From March 2020 to March 2021, a multidisciplinary study was conducted to look at the increase in CVS and related factors among school-age children in Nagpur taking online classes. The randomized controlled trial was used to select 600-school aged children between the ages of 4 and 17, and data was collected using a systematic questionnaire completed by the children's parents. Reporting method used to diagnose computer vision syndrome.

Results: CVS was found in 345 (57.5%) of the 600 children studied, which is very concerning. With proportions of 83.50 percent, 66.33 percent, and 62.17 percent, respectively, the most common reported signs of CVS were eyestrain, eye inflammation, and eye pain. CVS are linked to daily screen use and pre-existing eye disorder. CVS had a smaller effect on children whose parents were aware of the condition and who adopted the 20-20-20 guideline for screen time.

Conclusion: During lockout, the incidence of computer vision syndrome in school-aged children increased dramatically. To deter CVS, it is critical to reduce screen time, improve parent and child understanding of safety precautions, and receive management support. To protect a child's overall well-being, we encourage policymakers and parents to restrict e-learning, since it will never be a suitable replacement for conventional classroom instruction.

Keywords: Computer Vision Syndrome, gadget, children, dry eye, online schools, screen time

Comment [K1]: Too brad of a term

INTRODUCTION:

A novel coronavirus was discovered in Wuhan, China, in December 2019, nearly seven years since the MERS 2012 epidemic. This finally had a global impact. On January 30, 2020, the World Health Organization declared the disease the Public Health Emergency of International Significance, and on March 11, 2020, it was declared a pandemic. This pandemic brought with it a digital revolution. Children and adolescent population across the world had to pursue online schools and colleges. Millions of them were already suffering from eye

ailments like ocular allergy, dry eye, refractive errors, amblyopia, squint,etc. Gadget addiction has worsened during the COVID-19 pandemic and led to a surge in Computer Vision Syndrome (CVS) also called digital eye strain. A study conducted in 30 Indian cities found that children's addiction to electronic devices had increased by almost three times as they spent two to five hours on screens, while 50% of them could not avoid the gadgets for even 30 minutes. The negative impact has been felt on the physical, mental, emotional, and social well-being of the beloved minds.

Comment [K2]: A proper term would probably be "electronic devices"

Mobile phones being handy are the most preferred medium for online teaching. Their use was somewhere between 1-8 hours per day per child. Financial burden of buying laptops limited the use of large screens to only the rich and the affluent. An increase in asthenopic symptoms occurs with a decrease in the screen resolution [1,2].

Global data shows the nearly 60 million people suffering from CVS and 1 million new cases occur every year [3].

Duration of gadget usage, poor lighting, glare, screen brightness, lesser screen resolution, pre-existing visual ailments, and improper study environment are risk factors for CVS. CVS is a growing public health issue that can significantly affect the ~~students~~student's quality of life and their current as well as future productivity.

AIM: To assess the prevalence of computer vision syndrome (CVS) and associated risk factors among school going children of Nagpur attending regular online classes owing to lockdown in COVID pandemic.

METHODS AND MATERIALS

Study Area and Period

The study was conducted in the city of Nagpur, the winter capital of the Indian state of Maharashtra. According to the Oxford Economic report, Nagpur is expected to be the fifth fastest-growing city in the world from 2019 to 2035 with an average growth rate of 8.41%.

Source and Study Population

All children attending regular online schools in Nagpur were taken as study population. Screen time included collective usage of laptops, tablets, mobile phones and television usage.

Operational Definition

Computer vision syndrome: Children with at least one or more symptoms of computer-related or occasional or persistent symptoms for at least 7 days during the study period are considered positive with CVS. The presence of eye and near eye pain, headache, difficulty seeing near and / or distant, dry eyes, sore / irritated eyes, red eyes, excessive tearing, double vision, blurred vision, and color vision are included in CVS symptoms in this study.

Gadget users: Students who are attending regular online classes during lockdown in COVID era along with additional screen time for recreation or extracurricular activities.

Data Collection Method

To gather sociodemographic evidence, signs of CVS, specifics of gadget use, possible risk factors (environmental and behavioral factors), and parent knowledge of CVS safety steps, researchers used a self-administered questionnaire (SAQ) accompanied by observational checklists. A group of health-care professionals collected the information. A supervisor was appointed to oversee data collection and ensure that the questionnaires were accurate.

OBSERVATIONS AND RESULTS: A total of 600 participants were included in this study. More than half 356 (59.33 %) of the respondents were male,64.33% children were in prepubertal age group, and 64.33% participants had not even passed 5th standard (Table 1).

Table 1: Sociodemographic characteristics of school going children attending online classes in Nagpur:(n=600)

Variables:	Frequency	Percent
Age(in years)		
4-10	386	64.33
11-18	214	35.67
Sex:		
Male	356	59.33
Female	244	40.67
Educational status:		
Below or studying in 5th standard	386	64.33
Above 5th standard	214	35.67

Table 2Gadget usage data of school going children attending online classes and their study place environment(n=600).

Variables	Frequency	Percent
Gadget Usage:		

Only smart phone	116	19.33
Only Laptops/Desktop/Tablets	102	17
Both smart phones and laptops	209	34.83
Television plus smart phone	79	13.17
Television plus laptop	44	7.33
Television plus mobile phones plus laptop	50	8.33
Total number of years of gadget usage:		
< 1 year	315	52.50
>1 year	285	47.50
Total daily screen time:		
< 2 hours	142	23.67
2-4 hours	239	39.83
4-6 hours	111	18.50
>6 hours	108	18.00

Majority (34.83%) of the students used both computer and smartphones for online studies. 52.50% participants were gadget users for less than a year. A major proportion(63.50%) of children used gadgets for less than 4 hours. More than two-thirds (70.7%) of the participants usually used desktop computers. (Table 2)

Table 3: Study environment and precautions taken during online classes:

Variables	**Frequency**	**Percent**
Correct sitting posture:		
YES	205	34.17
NO	395	65.83

Maintenance of proper screen to eye distance:		
>50cm	159	26.50
<50cm	441	73.50
Source of light at study place:		
Natural solar light	145	24.17
LED	205	34.17
Non LED	350	41.67
Usage of antiglare covers on gadget screens:		
YES	198	33.00
NO	402	67.00
Use of blue tinted glasses:		
YES	20	3.33
NO	580	96.67
Videogame/Playstation user:		
YES	49	8.17
NO	551	91.83

Nearly one-thirds of the students (34.17%) had correct sitting posture. Only a quarter of the participants maintained proper screen to eye distance. 85(14%) students had a previous history of eye illness.41.67% students has a non LED source of lighting in their study rooms. Antiglare screen protection was used by only one thirds of the children while only 20(3.33%) students used blue tinted glasses.8.17% children played video games for recreation. (Table 3)

Table 4: Preexisting eye ailments in children and additional factors associated with CVS and gadget usage:

Variables	**Frequency**	**Percent**
Taking intermittent screen breaks:		
YES	189	31.50
NO	411	68.50
Children with preexisting ocular ailments:		

Refractive errors	60	10.00
Allergic eye disease	39	6.50
Crossed eye	6	1.00
Lazy eye	3	0.50
Xerophthalmia	2	0.33
None	490	81.67
Are parents aware of CVS?		
YES	40	6.67
NO	560	93.33
Associated weight gain:		
YES	109	18.17
NO	491	81.83

Table 5: Symptoms of CVS:

	Frequency	Percentage
Blurred vision	216	36
Eye pain	373	62.17
Eye irritation/Grittiness	398	66.33
Red eyes	121	20.17
Headache	322	53.67
Watering	95	15.83
Eye strain	501	83.50

Eyestrain, eye irritation and eye pain were the commonest reported symptoms of CVS with a prevalence of 83.50%,66.33%, and 62.17%, respectively. Headache was reported in approximately ~~a~~ half of the children.15.83% children had complaints of watering and a gift of them developed red eyes. (Table 5)

DISCUSSION

This study was aimed to assess the prevalence of CVS and associated risk factors in school going children in Nagpur attending e-classes for studies as well as for gaming and recreation purposes. The self-reported prevalence of CVS among students undergoing e-classroom teaching was 83.50%.

A European study reported that 68% of children use computers and 54% work online. [4] Most of the children in our study were students who were under or under 5th grade. The average time spent in front of digital devices in our study was 2-4 hours similar to a study conducted in the UK, during which participants spent approximately 4 h per day on digital devices. [4] In a study conducted in rural India, they reported that the average time spent in front of a children's screen was about 2.7 ± 1.7 h, [5] less than in our group. 4 hours on digital devices, similar to the pattern of a study conducted by Badri et al., Who reported that the average time spent on student social media was 5.2 h per day. [6]

In our study children only 34.17% students maintained proper sitting posture and only a handful (8.17%) of them wore blue tinted glasses. In a study conducted in India before the COVID era, only 40% of children used smartphones for the purpose of a school project, and only 3.3% used> 5 h per day on digital devices. [7] In addition, 73.50% of children used digital devices at a distance of <18 inches, in contrast to a study by Ichapujani et al [8] in which 56% maintained a reasonable range of digital devices of students were associated with weight in our study.

Laptops and smartphones emit high-intensity or high-intensity blue light, which puts pressure on the ciliary muscles of the eye causing eye strain from using the gadget for long periods of time. Therefore, reducing computer time is important to prevent CVS [9].

We cannot focus on pixel-generated images on a computer screen for long periods of time. Eye tissue stays and relaxes most of the time when we take long breaks on the screen. Delayed gadget regeneration results in a high-gloss screen [10]. Studies in India show those computer users with existing eye diseases were at greater risk of getting CVS [11].

Limitation of the Study

The major limitations of our study was lack of clinical confirmation of CVS and the symptoms reported were purely subjective.Early symptoms might have been missed by parents.CVS symptoms like headache,eyeache,blurred vision,watering etc may simulate symptoms due to other ocular or systemic problems that could have potentially overestimated the prevalence [12-15].Students studying in higher standards are more susceptible for CVS due to longer screentime.Parent education and awareness regarding CVS might have influenced filling of the questionnaire.

We recommend that every child attending online schools should be screened for refractive error and CVS post lockdown and addressed methodologically by a proper ophthalmic examination. [16-17]

CONCLUSION

The prevalence of computer vision syndrome has been found to increase dramatically during school closure. Pre-existing illnesses, daily computer use, extra television time, increased video games (full screen time every day), frequent visits to eye clinics, effective use of eye drops and parental awareness were CVS variables. Increasing exposure time, improving parent-child and child awareness through safety measures, and administrative support are essential to prevent CVS. To maintain the full health of the child we urge policymakers and parents to reduce e-learning as it will not be a viable alternative to traditional classroom teaching.

Data Availability

Data will be made available from the primary author upon request.

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