



An evaluation on the prevalence of visual problems during children online education in COVID pandemic – a cross sectional study

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ABSTRACT

Purpose: COVID pandemic has influenced the lives of all the people to a greater extent. It has brought the different populations of people in different parts of the world stay indoors. Having adorned with the digital technology available in the country, the private schools and colleges had started to continue their online classes through platforms like zoom meetings and google classrooms and other available resources to keep the school children on their educational mark. These online classes that were created to place the children busy in virtual classrooms not only hindered academic progress but also developed a lot of health issues on exposure to the electronic gadgets during the lockdown. The present study evaluated the prevalence of eye problems in school aged children undergoing online education in Chennai city. **Methods:** The study developed a questionnaire to frame questions that relate to the age, duration of online class experienced, mode of digital device used, eye problems and refractive errors developed, postural adaptations, illumination status of learning environment. Results: The results revealed that about 43.3 % participants used smart phone, 37.5 % participants used I pad during online classes and 37.3 % participants underwent online system of education for the past 1 year and 30.4 % participants for more than 2 years. In regard to visual acuity, about 64.7 % participants faced difficulties for far vision and 35.3 % participants for near vision. About 57.8% children responded they had started wearing glasses recently after online classes had started. **Conclusion:** Thus, the study concluded that a significant population of children developed eye problems due to online class exposure in digital device. The study enlightens that parents and teachers to take necessary actions towards this health issues in school children.

Key words: COVID pandemic, indoor, online class, eye problems.

INTRODUCTION

The COVID pandemic had affected the lives of all the people to a greater extent. It has brought a state where the people of different parts of the world were made to stay indoor. The rapid spread of virus SARS- associated coronavirus identified in China in February 2003 and spread its wings to the adjacent countries. SARS is an airborne virus and can be transmitted through smaller droplets of saliva in a similar way to the cold and influenza. Covid-19 infection may be asymptomatic or mild in most patients. The typical symptoms were seen at the beginning of the pandemic and some of them present with atypical symptoms such as muscle pain, loss of taste or smell, and headache. But in some cases, it leads to respiratory failure, renal failure and multiple organ failure. ⁽¹⁾The World Health Organization with the assistance of the Global Outbreak Alert and Response Network (GOARN) co - ordinated and worked with health authorities in affected countries to promote epidemiological, clinical and logistical support to bring this infectious outbreak under control. Most patients identified with SARS infection were

previously belonging to healthy adults aged 25–70 years. But now few suspected cases of SARS have been reported among children under 15 years. The fear of infection and mortality rates created a lot of precautionary measures to be taken by the government.⁽²⁾ A report says that across the world, many countries at different points in their COVID-19 infection rates with more than 1.2 billion children in 186 countries were affected by school closures due to the pandemic. With the sudden drift away from the classrooms, the schools have started adopting the method of online learning that led to the creation of virtual classrooms in the home environment. In the midst of Covid-pandemic, there was a greater significant demand for online learning platforms that offered free access to educational services like, BYJU'S etc.⁽³⁾

Today, huge populations of children are under use of computers on a daily basis at school and at home for both education and recreation. But this trend has increased in Children experience various health problems that crop up as screen time increases for students due to closure of schools being shut in the Covid-19 pandemic. It has bothered parents of such children with complaints of headaches, eye problems and has increased the stress surface, it has been learnt. A review report explored that about 88 percent of Americans who used digital devices had negatively affected their vision due to the reason that an average American spends about seven or more hours per day looking at their screens on devices like smartphones, tablets, LED monitors and flat-screen TV's. The report also claimed that About 11 million Americans over age 12 do need visual correction due to this reason.⁽⁴⁾ There were scanty studies in South India on the evaluation of visual problems in children after the covid pandemic. So, the present study planned to investigate the prevalence of eye problems in children undergoing online education amidst the COVID 2020 pandemic.

MATERIALS AND METHODS

Significance of the Study

The significance of this study is to create awareness among teachers, parents and children about the influence of online education and the use of digital devices on the children health status particularly in preference to eye defects developed by the children. This study also enlightens the fact that problems like eye fatigue, refractive errors, dry eyes, itching and redness of eyes, blurred vision that might develop in chronic duration exposure of eyes to digital device usage.

The research design adopted for the study will be a descriptive survey.

Study Group: The study involved 100 school students studying in different schools in Chennai city, of both genders in the age group from 5 years to 20 years. These students were assured that they were undergoing online classes during the COVID pandemic for the past one and half years. The respondent category belongs to Montessori sections, primary school and Higher secondary school. The students were well aware of handling social networking sites are Yahoo messenger, Facebook, Whatsapp, twitter, black berry messenger, 2Go messenger, SKYPE, Google talk, Google messenger, Instagrams, and other social media platforms.

Sample and Sampling Technique

A total sample size of 100 students were randomly selected using confidence interval of 5 and confidence level of 95% (0.05)

Validity of the Instrument

The designed questionnaire was submitted to all the participants and their responses were collected.

Purpose of the study

The objective of the present study is to evaluate the effect of online education during the COVID pandemic on the overall health of the children and in particular the vision problems.

Specifically, the study concentrates

1. To evaluate different digital devices used by school students.
2. To evaluate the age and standard of education level.
3. To evaluate the duration of exposure to online education.
4. To evaluate the different eye problems that has risen in them during online education
5. To evaluate the refractive error that they have attained in due course of attending classes.
6. To evaluate whether they have started wearing glasses recently
7. To evaluate whether the children engaged themselves in other activities using digital devices like watching you tube videos, using whatsapp, Instagram, playing mobile games.
8. To evaluate the posture of the child while attending online classes.
9. To evaluate the illumination status of the room used for online classes by the child.
10. To evaluate the overall associated health problems that the child experienced during the course of online education.

Research Instrument

The eye fatigue questionnaire consisted of 10 questions. It measured the prevalence of eye fatigue, aching eye, irritation and watering of eyes, refractive errors, blurred/doubled vision, difficulty in focusing the screens, headache or any other visual discomfort. This online education eye health scale taken up in this study during Covid-19 pandemic consisting of four-item specified answers and yes or no response. This eye assessment questionnaire or online education eye health scale was administered through Google forms amidst the Covid-19 pandemic. The assessment was made in the month of May 2021.

Appendix – Questionnaire

Sno	Questions	Response required
1	What is your age?	1. 5- 7 yrs 2. 8- 10 yrs 3. 11-15 yrs 4. 16-20 yrs
2	What is your standard of education?	1. Class 1 to 5 2. Class 6 to 10 3. Higher secondary level
3	What device are you using for online class?	1. Smart phone 2. Tablet 3. Computer 4. Laptop 5. I pad
4	What is the duration of your online class?	1. Less than 1 hour per day 2. 2-4 hours per day 3. 5-6 hours per day

		4. More than 7 hours
5	How many years are you undergoing online education?	1. 6 months 2. 1 year 3. 2 years 4. More than 2 years
6	Do you develop the following symptoms in the course of online education?	1. Eye pain 2. Frequent rubbing of eyes 3. Itching and redness of the eyes, watering of eyes 4. Eye fatigue (tiredness) 5. Headache 6. Blurred vision (Not able to see clearly) 7. Inability to move the eye
7	Are you able to see far objects clearly?	1. Yes 2. No
8	Are you able to see near objects clearly?	1. Yes 2. No
9	Did you start wearing glasses recently	3. Yes 4. No 5. Wearing glasses from childhood
10	Apart from online class, are you engaged for any of the following activities?	1. School activities 2. To play mobile games 3. To watch movies 4. For whatsapp and Instagram 5. To watch you tube videos
11	What is the posture you prefer during online classes?	1. Holding device in hand 2. Table and chair set up 3. Lying position in bed
12	What is the environment around you during online class?	1. Good lighted environment with no disturbing sounds 2. Dim lighted environment 3. Glaring environment with sunlight or tube light

13	What is your overall experience about health problems developed during online education?	4. Good health 5. Disturbed health with associated neck and back problems 6. Disturbed health with eye problems 7. No changes in my health
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Method of Data Analysis

Responses from the questionnaire will be analyzed using the descriptive statistics of frequency counts and percentage. Descriptive statistical method of frequency counts, percentages will be used in analyzing demographic variables and research questions.

Results

The responses were collected from google docs Forms. The responses showed that 56.7% participants aged 15 -20 years; 28.8 % aged 10 - 15 years; 13.5 % aged 8- 10 hrs; 1 % aged 5-7 yrs. When the students were asked for their standard of education, the response was 53.9 % participants in class 1-5; 35.3% participants in class 6-10;28.8 % aged 10 - 15 years; 10.8 % in Higher secondary school. (Figure 1). The Children were asked for what device they were using for online class” 43.3 % participants used smart phone, 37.5 % participants used I pad; 8.7 % participants used Laptop; 5.5 % participants used tablet; 5 % participants used Computer. (Figure 2). The students were asked for what their duration of online class and the response was that 43.7 % participants had more than 7 hours per day; 27.2 % participants had more than 5-6 hours per day; 25.2 % participants had 2-4 per day; 4.1 % participants had less than 1 hour per day. The students were asked for how long they were you undergoing online education. The response was that 37.3 % participants underwent for 1 year; 30.4 % participants underwent for more than 2 years: 26.5 % participants underwent for 2 years: 5.8 % participants underwent for 6 months (Figure 3). The students were asked for any visual disturbances during online class. About 33.3% responded eye fatigue, 17.6% head ache, 13.7% Itching and redness, 11.8% difficulty in moving the eyes and 8.85 responding with eye pain (Figure 4) The students were asked whether they were able to see far objects clearly “, 64.7 % participants responded yes; 35.3 % participants responded no.(Figure 6). The students were asked whether they were able to see near objects clearly “, 64.7 % participants responded yes; 35.3 % participants responded no. (Figure 5). The children were asked whether they had started wearing glasses recently and 57.8 % participants responded no; 24.5 % participants responded yes; 17.6 % participants responded that they were using glasses from childhood (Figure 6). The children were asked apart from online class what are the activities they engage using digital devices and “, 61.5 % participants responded that they play mobile games; 61.5 % participants responded for whatsapp and Instagram; 42.3 % participants responded that they watch you tube videos; 33.7 % participants responded to watch movies. When the children were asked about what posture they adopted during online class and 58.7 % participants responded that they were holding device in hand; 29.8 % participants responded using table and chair set up; 11.5% participants responded lying position in bed. The students were asked about the environment around them during online class and 43.1 % participants responded that they were using Good lighted environment with no disturbing sounds; 37.3 % participants responded dim lighted environment; 19.6 % participants responded glaring environment with sunlight and tube light. The students were asked about their overall experience about health problems developed during online education and 38.5 % participants responded that they were having disturbed health with associated neck and back problems; 34.6 % participants responded that they had disturbed health with eye problems; 17.3% participants responded no changes in their health; 9.6% participants responded good health (Figure 7)

Standard of education

What is your standard of education?

102 responses

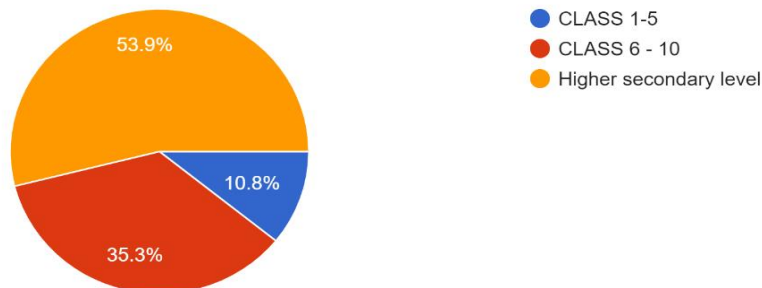


Figure 2: Pie chart depicting response to the question, “what is your standard of education?” 53.9 % participants in class 1-5; 35.3% participants in class 6-10; 28.8 % aged 10 - 15 years ; 10.8 % in Higher secondary school.

Device used for online class

What device are you using for online class?

104 responses

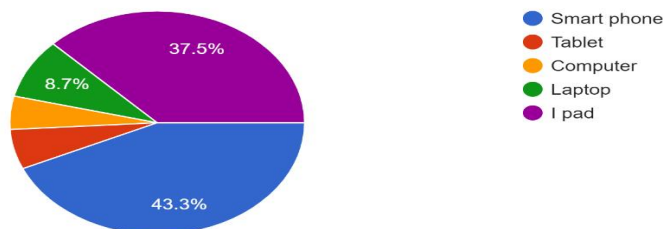


Figure 3: Pie chart depicting response to the question, “what device are you using for online class” 43.3 % participants used smart phone, 37.5 % participants used I pad; 8.7 % participants used Laptop; 5.5 % participants used tablet; 5 % participants used Computer.

Total Duration of online class

How many years are you undergoing online education?

102 responses

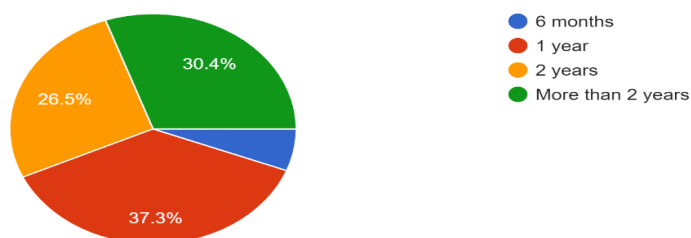


Figure3: Pie chart depicting response to the question, “How many years are you undergoing online education “37.3 % participants underwent for 1 year; 30.4 % participants underwent for more than 2 years: 26.5 % participants underwent for 2 years: 5.8 % participants underwent for 6 months

Visual difficulties after online education

Do you develop the following symptoms in the course of online education?

102 responses

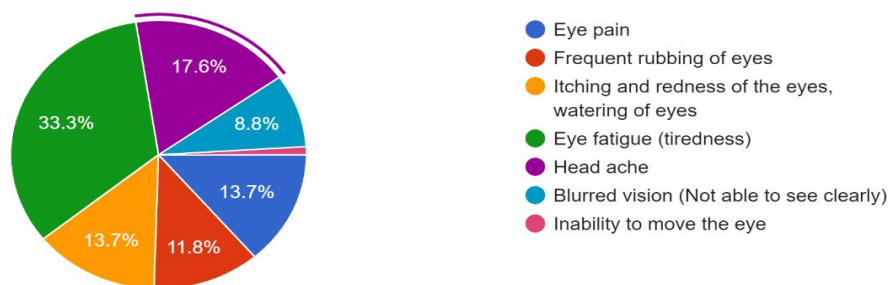


Figure 4: Pie chart depicting response to the question, “Do you develop the following symptoms in the course of online education. About 33.3 % participants had eye fatigue; 17.6% participants had head ache; 13.7 % participants had itching and redness, watering of eyes; 11.8 % participants had frequent rubbing of eyes; 13.7 % had eye pain; 8.8 % had blurred vision and 1.1 % were unable to move the eyes

Visual acuity for far vision

Are you able to see far objects clearly ?

102 responses

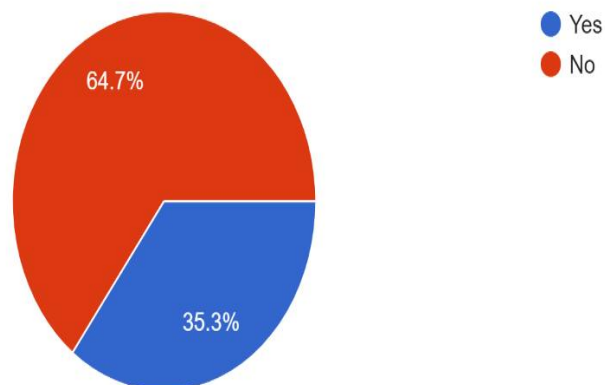


Figure 5: Pie chart depicting response to the question, “Are you able to see far objects clearly “, 64.7 % participants responded yes; 35.3 % participants responded no.

Visual acuity for near vision

Are you able to see near objects clearly ?

102 responses

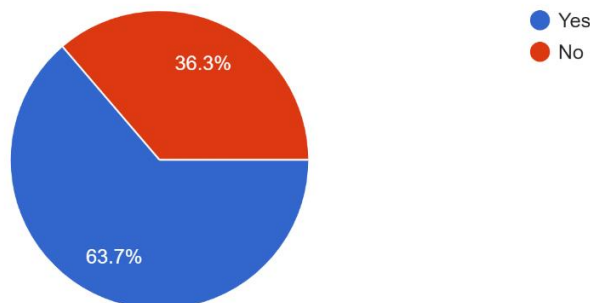


Figure 6: Pie chart depicting response to the question, “Are you able to see near objects clearly “, 63.7 % participants responded yes; 36.3 % participants responded no.

Overall experience about health problems during online class

What is your overall experience about health problems developed during online education

104 responses

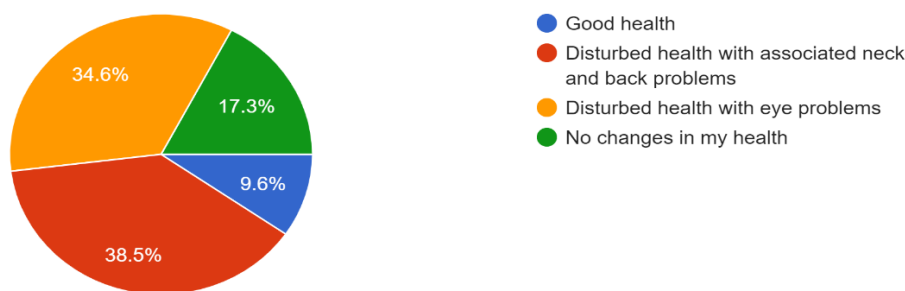


Figure 7: Pie chart depicting response to the question, “What is your overall experience about health problems developed during online education”, 38.5 % participants responded that they were having disturbed health with associated neck and back problems; 34.6 % participants responded that they had disturbed health with eye problems; 17.3% participants responded no changes in their health; 9.6% participants responded good health.

Discussion

In accordance with our reports, the study also concluded that due to COVID-19 in 2020, the school children were confined to their homes almost a year from 2020 where online classes were offered. The children underwent classes for 1 hour for grade 1 and 2, 2 and ½ hours for grade 3-6 yrs. The time spent by children for outdoor activities greatly decreased and thus, Lessened outdoor activity was significantly associated with a higher incidence of myopia in school children.

Scientific research has explored that the radio frequency waves emitted by mobile phones affect children's health for a longer duration. Also, many medical researchers claimed that magnetic resonance imaging (MRI) technological scans have shown that children in the age 5 and 8 years had a greater specific absorption rate compared to adults⁽⁵⁾.

Another report by Aqeel Abbas Noaman et al 2019 explained that waves emitted by mobile devices by radiofrequency waves. The frequency of radiations emitted from the mobile usage range from 3 kHz to 300 GHz^(5,6)

The children of the present world are living in a visually demanding world. The children are already abundantly provided with electronic devices, tablets, video games, mobile phones and laptops for various entertainments. Added to the visual demands, the schools had laid their online platforms for e learning of their education. Children are exposed to an average of 8–12 h a day on some form of digital device in a day for their education. Many studies were also created to study the problems encountered by the children by exposing them to online education⁽⁴⁾

Conclusion

The study enforces the vulnerable damage to the eye caused to children due to more duration of exposure to smart phones during online education. The children of school age develop problems like nearsightedness, astigmatism, eye fatigue, redness of eyes, dry eyes, blurred vision, and digital eye syndrome due the radio emissions emitted by digital devices for longer usage in the pandemic situation. Parents should be well aware of the prevalence of such eye problems caused by digital smart phones. The school management, teachers and parents must consider the duration, type, and distance to keep the digital device from the eyes during online class hours.

References

1. Misra, A., Sowmya, A. and Compton, P. (2009) 'Impact of quasi-expertise on knowledge acquisition in computer vision', 2009 24th International Conference Image and Vision Computing New Zealand. doi: 10.1109/ivcnz.2009.5378387.
2. Online classes come at the cost of eye problems for students (no date) The Kathmandu Post. Available at: <https://kathmandupost.com/national/2020/09/18/online-classes-come-at-the-cost-of-eye-problems-for-students> (Accessed: 20 May 2021).
3. Ostrovsky, A. et al. (2012) 'Effects of job-related stress and burnout on asthenopia among high-tech workers', *Ergonomics*, pp. 854–862. doi: 10.1080/00140139.2012.681808.
4. Sheppard AL, Wolffsohn JS. Digital eye strain: Prevalence, measurement and amelioration *BMJ Open Ophthalmol.* 2018;3:000146
5. Fowler, J. and Noyes, J. (2017) 'A study of the health implications of mobile phone use in 8-14s', *DYNA*, pp. 228–233. doi: 10.15446/dyna.v84n200.62156
6. Ak, S. (2016) 'Impact of Excessive Mobile Phone Usage on Human', *Journal of Computer Science & Systems Biology*. doi: 10.4172/jcsb.1000235