



TO EXPLORE THE ASSOCIATION OF SYMPTOMS OF OCULAR AND GENERAL ASTHENOPA IN CHILDREN OF THE AGE GROUP OF 2 - 18 YEARS DURING COVID19 PANDEMIC WITH THE DURATION OF SCREEN TIME, AS REPORTED BY PARENTS AND FIND OUT WAYS TO MITIGATE THE SAME

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ABSTRACT **AIM:** To explore the association of symptoms of ocular and general aesthenopia in children of the age group of 2 – 18 years during COVID19 pandemic with the duration of screen time, as reported by parents and find out ways to mitigate the same. **SETTING AND DESIGN:** E-survey duly approved by Institutional review board, was conducted wherein the questionnaire was sent to multiple forums randomly across the country via google forms. **METHODS AND MATERIAL:** Data was automatically stored on submitting questionnaire by user from where information was collected and inferences were made. **RESULT:** 1000 questionnaires were sent out of which we received responses. There were a significant number of children who were facing difficulties to cope up with higher screen time due to transition of classroom lectures to online lectures during COVID-19 pandemic. The study revealed that 49.7% used mobile phones as their primary device for online classes as well as entertainment purposes and 24.1 % children used overall screen time of more than 4 hours. About 11.6% complained of redness of eyes, 10.2% of burning sensation and 11.9% of watering on prolonged usage of electronic devices. Systemic complaints include sleep disturbances in 24.6%, irritability in 23.4%, tiredness in 13.1 %. **CONCLUSION:** Use of technology is part and parcel of our daily lifestyle. It has evolved to become a necessity rather than a mere choice; especially during the COVID-19 pandemic scenario specifically affecting school going children with the shift of classroom teaching to online lectures increasing the already high screen time. Suggestions to mitigate and reduce the impact of the same have been considered as well.

KEYWORDS : COVID-19 Pandemic, Screen Time, Ocular Aesthenopia

INTRODUCTION

The COVID-19 pandemic, which has swept the globe, has had a notable impact on the lives of children with unpredictable developments unfolding everyday as there's been lockdown in multiple countries on an unimaginable scale.

In response to the problems posed by the pandemic, various public health strategies mainly lockdown have come into play and have arguably had profound and potentially long term impact on mental and physical health, which is far worse for children as their schools are closed and no outdoor games are permitted making them more prone to the usage of vast array of electronic devices.

No doubt that technology has changed the ways people operate to a large extent. Our generation is highly tech savvy, we use electronic devices for practically all aspects of our life ranging from reading news, to study, work and even for entertainment and communication with family and colleague. According to a study performed teens form the major chunk of smartphones users, showing a rapid rise from 5% in 2012- 25% in early 2014 of 1-18 year age group^[1].

The aspect of going out and playing with peers has now been replaced with sitting at home and playing an online multiplayer game. Along with that, the children grow up watching their parents who are also trapped on their individual devices. Also, parents have great regard for gadgets as a way to engage their children and as an entertaining and educational tool.

The reason behind the slow progression of myopia due to outdoor activities has not been brought out, it's probably assumed to be related to daylight exposure. A study presented in 2011 American Academy of Ophthalmology reveals a reduction of up to 2% in the risk of myopia with each additional hour spent outside by children^[2]. In a study assessing the influence of physical activity and screen time on retinal microvasculature suggests a positive impact of physical activity and negative impact of even an hour of screen time being equivalent to arteriolar narrowing associated with 10-mm Hg increase in systolic blood pressure in children^[3]. Although a positive impact on cognitive development and academic skills have been found with negative

influence on psychological and social skills^[4]. We are aiming to find out ways on how the risk attached with higher screen time on devices on the child's eye can be mitigated and reduced.

METHODS

We conducted a study to understand the data on the screen time of children in the 3-18 years age group via google forms in April-June and duplicate entries were prevented by restricting access to the survey twice. The questionnaire was formed by a senior ophthalmologist and vetted by a pediatric ophthalmologist of the institute and the Institutional survey board approval has been done. We compiled the data based on age groups, presence of previous refractive error, frequent usage of particular device and comparison of screen time before and after lockdown. The questionnaire was sent to the parents who have visited OPD in the past 2 years in age corrected patients via google forms. The questionnaire included the following questions:

1. Age of the child? [2years-18years]
2. What is the power of glasses that the child wears?
3. What device does the child use frequently?
4. What is the overall screen time of your child?
5. What is the screen time requirement for study?
6. What is the screen time spent on recreational activities like watching TV, playing video games etc.?
7. Eye problems noticed in the child due to increased screen times? [Options included redness, burning sensation, watering, blurring of vision, none of the above, and others (to be specified)]
8. Any additional systemic problem noticed due to increased screen time?
9. Are you hoping to get your child's eye checked the moment lockdown is lifted?

RESULT

The major population brought into light in the questionnaire was of the age group 2-5 years (27%) followed by 5-8 years (20%) [Figure 1]. It was found that of the total 704 children included in the survey more than three quarter of them 77.4 % (540 children) did not wear spectacles highlighting the need to follow up these children post COVID-19 pandemic to rule out any acquired refractive error development [Figure 2].

Child's Age Distribution

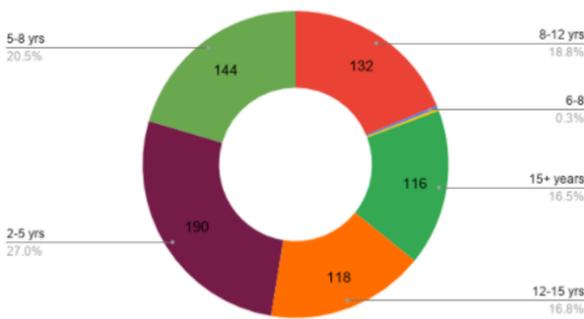


Figure 1 Age distribution of children who participated in the study

Power of glasses that the child wears.

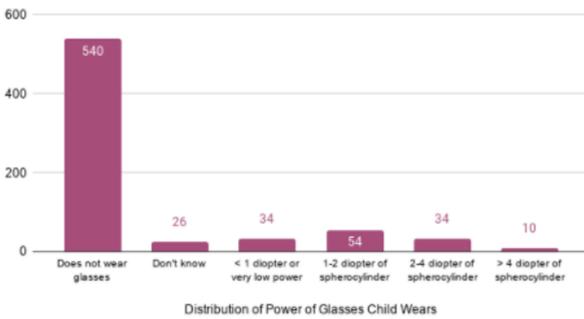


Figure 2 Power of spectacles worn by children

The survey also revealed that almost 49.7% (350 children) used mobile phones as their primary device for online classes as well as entertainment purposes and only a small subset of the survey used laptops 24% (102 children) as their primary device [Figure 3].

Device that your child uses mostly

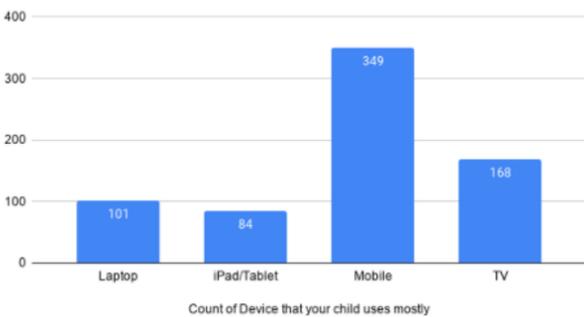


Figure 3 The devices used by children

Further, it was found that maximum children use overall screen time of more than 4 hours (24.1%) of which about 1-2 hours were spent on both educational requirements (22.3%) and recreational activities (33%) each. [Figure 4]

Screen Time for Children

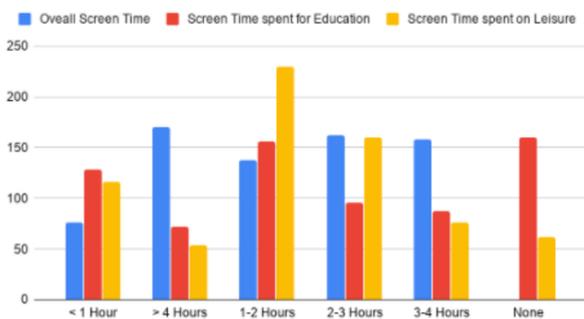


Figure 4 Total screen time of children including recreational and educational activities

A vast majority of parents (540) were not sure if their children were

suffering from any eye-related problems while about 11.6% (82 children) complained of redness, 10.2% (72 children) complained of burning sensation, and 11.9% (84 children) complained of watering on prolonged usage of electronic devices. The systemic complaints noticed were sleep disturbances in 24.6% (172 children), irritability in 23.4% (164 children), tiredness 13.1% (92 children) [Table 1]. The percentage of parents wanting to get their children eye checked post lockdown were 41.7%.

Ocular Symptoms		
Symptom	Number of Children	% Incidence
Not Sure	496	70.45%
Redness	82	11.65%
Watering	84	11.93%
Blurring of vision	32	4.55%
Burning sensation	72	10.23%
Systemic Symptoms		
Symptom	Number of Children	% Incidence
Depression	4	0.46%
Headache	76	8.80%
Irritable	164	18.98%
Not Sure	356	41.20%
Sleep disturbance	172	19.91%
Tired	92	10.65%

DISCUSSION

During the unavoidable lockdown of COVID-19 pandemics the dependency of a wide array of electronic devices has further increased. It has potential damages in the long term, especially for the younger age group, where children are exposed to the wide varieties of radiations at the stage of development. According to a study published in The Lancet Child and Adolescent Health journal - Early-life screen time linked to reduced physical activity in preschool children conducted on more than 500 children in Singapore falls right in place with WHO guideline. It suggests screen time of one hour per day or less among age group two to five years reveals healthy outcomes in later life. Virtual reality games have further helped the cause of active screen time. According to a study performed by Wu PC et al to find the effects of outdoor Activity during Class Recess on myopia onset and progression in school children reveals that the outdoor activities during recess time in school have a remarkable effect on myopia onset and myopic shift especially in non-myopic children^[5]. Gorely T et al further studied that children's television viewing and measured physical activity and their associations with family circumstances reveals children with highest TV screen time includes age group 9-13years (pre-adolescents), lower socio-economic strata, households with a single parent and ethnic minorities with children of African - American ethnicity watching the most TV^[6]. In a systematic review by Hale L et al of 67 published study from 1999 to 2014 revealed that screen time has negatively impacted the sleep outcomes leading to shortened duration and delayed timing in 90% of studies^[7]. According to a review on computer vision syndrome by Blehm C et al, the symptoms of prolonged use of computer include eyestrain, tired eyes, irritation, redness, blurred vision, and double vision and the etiology can be both ocular referring to ocular-surface abnormalities or accommodative spasms and/or extraocular (ergonomic)^[8]. Nowadays, with excessive use of cell phones it has become a habit of using mobile phones just before sleep specifically in dim lights or night-light. Recent epidemiologic studies suggested the positive association of night-lights were with myopia in a study involving 479 children aged 2 to 16 years in a tertiary care hospital^[9]. Furthermore two more studies based in the U.S were also suggestive of similar findings^[10,11].

In a study conducted by Saw sem et al to find the relationship between near-work activity, night-lights, and myopia in the Singapore-China Study revealed increased risk of higher myopia in children who read

more and are exposed to night lights before the age of 2 years^[13]. It has also been proven by D cui et al that near work and computer work has shown to increase axial length if these activities are done for more than 3 hours excluding school work and school duties^[1]. Study by L donovan et al have also shown the impact of seasonal variation on axial length progression and thus myopia in students in Chinese schools^[14]. There has been a study by Rusnak S et al suggesting the effect of active and regular sporting activities in preschool curriculum act as a preventive factor against increasing axial length^[15]. Having said that we also have to take into consideration that the use of these devices is inevitable for various purposes like easy information retrieval and excess to a wide variety of educational platforms. So there is an increasing need to gather ways where the impact of the ever-increasing screen time could be reduced to a certain level.

WHO (World Health Organisation) dictates clear age wise guidelines of screen time usage^[16]. For infants (Age group less than 1 year): No screen time has been permitted. For Children (Age group 1-2 years): For 1 year-olds, no recommendation of sedentary screen time which includes activities like watching TV, playing computer games. For those aged 2 years, sedentary screen time should not be more than 1 hour. For age group- 3-4 years: Sedentary screen time should not be more than 1 hour.

As we have noticed that the need of the hour lies in the use of the electronic devices and not in eliminating their usage following measures can be taken to prevent their impact and limit the screen time. Avoid the usage of electronic devices outside and in brightly lit environments as glare can produce unnecessary eye strain, remind the child to blink frequently amid prolonged usage of electronic devices, setting a timer to remind children of their allowed screen time, looking out of the window or at distance for at least 20 seconds after completing a task, using digital bookmarks in e-readers to remind kids to look at distance after a few pages, Encourage the reading of real books as an alternative to e-books, Promote children to play indoor games and engage in physical activities, Pre-recorded video lectures can be provided to children to be watched in properly divided sessions with rest in between, to adjust contrast and brightness of devices to a comfortable level, Ensuring good posture while reading or using electronic devices and holding the digital media at least 18-24 inches farther away.

However, considering the time we are all in, there are few constraints that we face to limiting screen time; namely excessive usage of electronics media by parents themselves makes it a harder task to limit the usage by children, Stricter screen time schedule, lack of motivation, limited outdoor activities amid the COVID-19 lockdown.

CONCLUSION

Technology is often considered both a boon and a bane, it's usage enables people to accomplish their tasks in a short span of time, educates as well as provides job to a large set of people; however, it's uncontrolled and unsupervised usage (especially for children) results in a number of physical and mental health issues. The goal of this study was to highlight the need of awareness among school going children and their parents about the harmful impact of high screen time. We have taken into consideration the inevitable nature of its usage in current condition. If at all the screen time has to be increased as due to the impact of COVID-19 pandemic, it should be broken down into multiple sessions in order to prevent ocular fatigue. As per WHO guidelines the recommended screen time is one hour/day but due to the inevitable situation of COVID-19 pandemic this has increased. We recommend limiting duration of online classes as per age of child that is less than 2 hours/day pre-recorded sessions in less than 8 years old children, less than 2-3 hours/day pre-recorded sessions in 9-12 years old children and 3-4 hours/day pre-recorded sessions in 13-18 years old children.

REFERENCES

1. Smartphone Users around the World – Statistics and Facts. Available from: <http://www.go-gulf.com/blog/smartphone>.
2. Sherwin JC, Reacher MH, Keogh RH, Khawaja AP, Mackey DA, Foster PJ. The association between time spent outdoors and myopia in children and adolescents: a systematic review and meta-analysis. *Ophthalmology*. 2012 Oct 1;119(10):2141-51.
3. Gopinath B, Baur LA, Wang JJ, Hardy LL, Teber E, Kifley A, Wong TY, Mitchell P. Influence of physical activity and screen time on the retinal microvasculature in young children. *Arteriosclerosis, thrombosis, and vascular biology*. 2011 May;31(5):1233-9.
4. Fiorini M. The effect of home computer use on children's cognitive and non-cognitive skills. *Economics of Education review*. 2010 Feb 1;29(1):55-72.
5. Wu PC, Tsai CL, Wu HL, Yang YH, Kuo HK. Outdoor activity during class recess reduces myopia onset and progression in school children. *Ophthalmology*. 2013 May

- 1;120(5):1080-5.
6. Hale L, Guan S. Screen time and sleep among school-aged children and adolescents: a systematic literature review. *Sleep medicine reviews*. 2015 Jun 1;21:50-8.
7. Gorely T, Marshall SJ, Biddle SJ. Couch kids: correlates of television viewing among youth. *International journal of behavioral medicine*. 2004 Sep 1;11(3):152-63.
8. Blehm C, Vishnu S, Khattak A, Mitra S, Yee RW. Computer vision syndrome: a review. *Survey of ophthalmology*. 2005 May 1;50(3):253-62.
9. Quinn GE, Shin CH, Maguire MG, Stone RA. Myopia and ambient lighting at night. *Nature*. 1999 May;399(6732):113-4.
10. Twelker JD, Mitchell GL, Messer DH, Bhakta R, Jones LA, Mutti DO et al, CLEERE Study Group. Children's ocular components and age, gender, and ethnicity. *Optometry and vision science: official publication of the American Academy of Optometry*. 2009 Aug;86(8):918.
11. Gwiazda J, Ong E, Held R, Thom F. Myopia and ambient night-time lighting. *Nature*. 2000 Mar;404(6774):144-.
12. Saw SM, Zhang MZ, Hong RZ, Fu ZF, Pang MH, Tan DT. Near-work activity, night-lights, and myopia in the Singapore-China study. *Archives of Ophthalmology*. 2002 May 1;120(5):620-7.
13. Cui D, Trier K, Ribel-Madsen SM. Effect of day length on eye growth, myopia progression, and change of corneal power in myopic children. *Ophthalmology*. 2013 May 1;120(5):1074-9.
14. Donovan L, Sankaridurg P, Ho A, Chen X, Lin Z, Thomas V, Smith III EL, Ge J, Holden B. Myopia progression in Chinese children is slower in summer than in winter. *Optometry and vision science: official publication of the American Academy of Optometry*. 2012 Aug;89(8):1196.
15. Rusnak S, Salzman V, Hecova L, Kasl Z. Myopia progression risk: seasonal and lifestyle variations in axial length growth in czech children. *Journal of ophthalmology*. 2018 Jan 1;2018.
16. New WHO guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age. Downloaded from: <https://www.who.int/news-room/detail/24-04-2019-to-grow-up-healthy-children-need-to-sit-less-and-play-more>.