

Progressive Myopia - another bane of the COVID 19 pandemic?

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Human beings witnessed a global crisis in the form of the COVID19 pandemic, which affected both physical and mental well-being of individuals. The devastating nature of the SARS-CoV-2 virus shook the world and since the time the virus was recognized in late 2019 a dramatic upsurge in myopia, especially in young children, is one aspect that has slowly gained prominence (1). Children and adolescents were already at greater risk since modernization has affixed them firmly onto the digital devices to compete in their respective fields of interest. Holden, Long and respective teams reported a shift of the curve for myopia cases, and it has been estimated to affect approximately half of the population, making it around five billion people by 2050, out of which 9.8% are likely to have severe myopia (2,3). Severe myopic patients are again more prone to retinal detachment and it has been suggested that myopia with associated pathological conditions might lead to loss of vision (4). A study conducted by Enthoven and team showed an increase in the odds of myopia in 9-year-old children, showing an association between myopia and near work/computer use (5). Digital Eye Strain (DES) or computer vision syndrome is an emerging threat to the public health due to excessive use of gadgets as well as sustained near work or closer working distance from digital screens, as reported by Huang and colleagues (6). Bhattacharya and members reported that DES mainly occurs as a result of photochemical damage of cells due to the emission of harmful short high energy waves from such devices (7). Usage of computers and smart phones puts the person in question at a higher risk for progressive myopia than television use. Along with that, Liu and team has established that the duration of engagement with such digital screen is positively associated with myopia related symptoms (8). Home confinement amidst the pandemic minimized the risk of exposure to the deadly Corona virus,

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but at the same time the draconian lockdown raised questions about public health hazards, among which 'quarantine myopia' is one topic which is certainly debatable. Earlier the studies of Qian, Lim and their fellow researchers had already revealed the high incidence rate of myopia in Asia since many years (9,10). A pre COVID period study showed that almost 80% Asian children had myopia whereas only 25% of the European children of the same age were myopic which was a clear evidence of high incidence rate in Asia (1). This crisis might have only got an up thrust during the COVID-19 lockdown due to an extraordinary leap in digital screen time of people. A UNESCO report stated that approximately 1.37 billion students (a whopping 80% of the world's student population) from over 130 countries have been affected by the e-learning approaches of education institutions during the COVID pandemic (11). China was the first country to see the emergence of the virus; hence the students in China followed by the other Asian countries were the first to experience the outbreak as well as the home confinement. Ever since the consequences of such actions are being recorded, myopia is one problem in which the incidence rate has risen further more than the pre-existing one. To be precise, both the prevalence and incidence have increased worldwide during the pandemic. An assessment carried out by Moore and team showed that 85% of 8 years old children spent 5.14 h/day on-screen during home confinement where the recommended average on-screen time limit is 2h/day in Canada (12). Curb in outdoor activities during lockdown deprived the children from effective classroom interaction. Recent studies carried out by Landreneau and colleagues showed that the prevalence of myopia exceeds approximately 28% globally (13) and numbers published by UNESCO reveal that digital learning during peak months of pandemic affected almost 1.5 billion young children from 192 different countries (14).

A case report published by Picotti and team stated that after confinement during 2020, 8-14 years old children were frequent visitors and among them 60% were girls. UNESCO declared that the mean annualized progression for the right eyes in 2019 was found to be 0.44 ± 0.52 D which further increased to 0.58 ± 0.53 D in 2020 during lockdown confinement (15). As reported by Singh, daily data usage of smart phones was double in myopic students as compared to non-myopic ones (16). In another study conducted by Wang and team, it was revealed that many other associated factors contributed to the accelerating progress of myopia such as time spent for outdoor activities, hereditary factors, regional differences and types of digital devices used during an outbreak (17). In a case report, Sumitha and team were of the opinion that approximately 79% of 917 students were found to be myopic between March-April 2020 in India (18). A substantial shift of myopic curve was observed by -0.3 diopters [D] by Wang and team during school photo screenings in 2020 as compared to last previous years between 2015 and 2019 (1). Klaver and colleagues observed 9-13 years old children and found that the mean refractive index showed greater myopia in girls than the boys (19), as they spend more time on-screen or on social media with less physical activity. According to Sydney



Adolescent Vascular and Eye Study, conducted by French and team, it was revealed that age factor also contributed to the occurrence of myopia because younger children were more sensitive to myopic triggering that develops from the environment. The study proposed that 6 years old myopic children spent 1.5 hours or more on a digital device than the children without myopia. However, the results were not same in case of 12-year-old children thus indicating towards the association of age factors (20).

It requires several protection protocols or recommendation guidelines to combat Myopia progression. Vision therapies have recently been adapted which play a significant role in minimizing these anomalies. Different interventions are there for myopia reduction *viz.* optimizing various environmental influences, topical applications as pharmacological intervention and lastly use of few optical devices such as multifocal spectacles or contact lenses with discrete dual focal designs (21). Allen, Vasudevan and researchers were also of the opinion that patients could try vision therapy tools like Hart Chart (22), lens flippers (23) and Brock string with beads of different colours. Gifford and colleagues also opined that documentation of ocular biometry could be beneficial to the practitioner during the evaluation process in implementing myopia control strategy (24). Visual hygiene could also be achieved by using larger gadget screens to minimize the visual fatigue, along with frequent blinking to minimize the dryness in the eyes (25). In the opinion of Naroo and team, contact lens could be another option against myopia progression (26).

Over the years, there has been emerging evidence about the association between the time of outdoor activities and the protection against the onset of myopia. Nemeth and colleagues reported that when children spent sufficient time in outdoor activities (more than 2 hours/day), the risk of myopia got reduced considerably, even when both their parents were myopic (27). Even the incidence of new cases of myopia over a period of one year got significantly reduced when the time spent outdoors was increased by an additional 80 minutes/day. The rate of progression of myopia got remarkably reduced in the children who spent this additional time outdoors, as compared to the children who did not (0.25 D to 0.38 D), as reported by Wu and team (28). Smith and other researchers hypothesized that brighter light outdoors stimulates the release of dopamine from the retina and inhibits axial elongation in animal models (29). Hence, wherever possible, involvement in outdoor activities like backyard farming or gardening or playing any kind of sport in the lawn, can greatly reduce the risk of developing myopia. As stated by Waleed and colleagues, the old-school trick of 20-20-20 (looking away every 20 minutes at an object 20 feet away for 20 seconds) (30) and certain eye exercises can be adopted by the teachers for the students, especially during long live study sessions. Forceful blinking of the eyes can also be encouraged. As reported by Wai, this exercise squeezes the meibomian glands which help with evaporative dry eye (1).



There are a few initiatives already taken to spread awareness through either social media platform or campaigns regarding myopia in children and how it is detrimental for them. As stated by Lanca and his team, the Global Myopia Awareness Coalition started to raise the awareness against childhood myopia amongst the parents in 2019 (31). Considering the importance of sleep hygiene, parents can also monitor sleep cycle of their children by using few web-based apps that helps in restricting the screen time. Chia, Trier and their colleagues also reported that use of low-dose atropine and 7-methylxanthine has been found to be effective in slowing down the progression of myopia (32, 33).

The government health agencies can tie-up with the educational institutions in order to shape out a more holistic curriculum. As put forwarded by Singh, a challenging yet necessary technological development would be to develop applications or wearable devices that would measure the digital screen time, the eye-to-screen distance and pop-ups that would assure breaks to be taken by the user (16). Futuristic applications that can automatically cut of the usage of data after a certain period of time, especially for the kids, can be pondered upon to be developed. The COVID-19 pandemic was indeed an unrivalled wake-up call for the government, the educational institutions, health sector, the research and development units and the parents, to acknowledge the fact that myopia can indeed turn out to be the future monstrous epidemic in many countries, if careful strategies are not developed and applied upon in the educational institutions and also at work places, as soon as possible.

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