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PERCEPTION OF AMBLYOPIA AMONG THE PARENTS DURING LOCKDOWN IN PANDEMIC SITUATION: AN OVERVIEW

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ABSTRACT
On December 30th, 2019, Dr Wenliang Li alerted the world about the possibility of a SARS-like virus outbreak in Wuhan, China. Several months later, the World Health Organization (WHO) declared COVID-19 to be a “Pandemic” outbreak. As of April 10th, 2020, there were more than 1.2 million infected patients worldwide, with close to 100,000 deaths. Research has focused mainly on the epidemiology, risks modelling, pathophysiology and clinical features of SARS-CoV-2, but the impact of increased digital screen time secondary to the lockdown and quarantine measures in many cities worldwide on amblyopia has largely been unnoticed. The rise in usage of digital technology and online e-learning during this pandemic outbreak may jeopardize the effectiveness of these policies. In this perspective, we discuss the disruption of the COVID-19 pandemic lockdown measures on the learning environment of children and adolescents, review the evidence on digital screen time and its impact on amblyopia, and make recommendations to reduce the detrimental effects on amblyopia during and beyond this outbreak. Eye diseases seldomly carry a fatal outcome; however, they do represent high morbidity. Children's lives revolve around playing outdoors, reading, indoor games, watching television but the Corona virus disease 19 outbreak has left them with limited options. Increased screen-time, prolonged near work, reduced outdoor activities are some of the important risk factors for amblyopia according to various studies. Countries like China, where schools have replaced books with tablets and computers, evidently have a higher incidence of amblyopia. Likewise, Indian schools have also began to gradually adopt digital teaching methods. But the outbreak of COVID-19 has made it mandatory for all classes to be held online. In addition to classes being held online, class notes are circulated through WhatsApp groups or email. Hence, a child on an average spends about 4-6 hours on these devices for academic purpose in addition to playing on the hand-held devices. With the “lockdown” issued by the Government of India, people are forced to stay indoors. Children are encouraged to stay indoors due to the fear of contracting the COVID-19 infection. Furthermore, with parents having to work from home, they are forced to hand these devices to even infants to keep them engaged.

KEYWORDS: Amblyopia, COVID-19, Digital technology, Lockdown, Digital screen time.

INTRODUCTION
Amblyopia (from the Greek, amblyos—dull/ dim, opia—vision) is a developmental abnormality that results from physiological alterations in the visual cortex and impairs form vision. It is often successfully treated by patching the sound eye in infants and young children, but has long been widely considered to be untreatable in adults. However, a growing number of recent studies have suggested that there is substantial plasticity in the visual system of adults with amblyopia. COVID-19 pandemic has changed the priorities of life, almost overnight, from real world interactions to the online space. The optometrists in India have started addressing the far-reaching consequences of the enhanced screen time and less outdoor time – that is likely to harm vision in adolescent population and put them at higher risk of developing amblyopia. Amblyopia is a common ocular disorder, with around 2.5 billion amblyopic people around the world. The estimates of WHO that half of the population of the world may be amblyopic by 2050 shall be reached sooner if appropriate preventive measures are not taken. Vision impairment related to amblyopia not only has a significant economic impacts but adversely affects the quality of life with regards to patients physical, emotional and social functioning.

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Definition

Amblyopia is clinically defined as reduction of visual acuity in one or both eyes, caused by abnormal binocular interaction during the critical period of visual development that cannot be attributed to any ocular or visual system abnormality or to refractive error. The American Academy of Ophthalmology considers amblyopia an intraocular difference of 2 lines or more in a visual acuity table (without specifying any), or visual acuity worse than or equal to 20/30 with the best optical correction. With an incidence of 3% to 6%, amblyopia is the most common cause of low visual acuity in children and adults in developed countries and has great economic and social impact. Individuals with amblyopia often have restricted career options and reduced quality of life, including less social contact, cosmetic distress (if associated with strabismus), low self-esteem, visual disorientation, and fear of losing vision in the other eye.

Pathophysiology

Though well-known since antiquity, many neural, physiological, and psychological aspects of amblyopia are still not fully understood. Classically defined as a decrease in visual acuity (which is clinically easier to assess), reduced contrast sensitivity of high spatial frequencies, and a binocular vision deficit, amblyopia also affects the development of a broad range of neural, sensory, oculomotor, and perceptual functions of vision. Different visual functions are not fully developed at birth; their full development depends on 3 fundamental conditions during the critical period of visual development in infancy: adequate stimuli received from each eye, ocular parallelism (corresponding images), and integrity of the visual pathways. Disturbances on input of stimuli received by visual cortex during this plastic and unstable stage of visual development prevent proper use of inputs from the involved eye, culminating in amblyopia. The impact on the visual system is closely related to the time at which the visual disturbance begins, and its intensity, type, and duration. When the visual stimulus disorder is precocious, severe, unidentified, and not reversed in the first months or years of life, it can lead to profound structural modification of the visual neuronal circuit, causing definitive morphological changes in cortical structures of the lateral geniculate nucleus (LGN) and visual cortex, which lead to definitive alterations in the final visual function of amblyopic eyes.

Types of Amblyopia

Deprivation amblyopia

Deprivation happens when eye diseases prevent the light stimulus from reaching the retina, thus forestalling the normal visual process. It also may occur due to anatomic deficits of the retina or optic nerve, or abnormal movement disorders of the eye (nystagmus). When it occurs during the critical period of visual development, it can cause amblyopia. The main diseases that cause this are congenital cataract, blepharoptosis, nystagmus disorders, optic nerve coloboma and hypoplasia, retinal disorders, persistent fetal vasculature; other disease processes can also result in amblyopia.

Refractive Amblyopia

Uncorrected refractive errors are considered the most common cause of amblyopia. There are two main types of refractive amblyopia. Anisometropic amblyopia refers to unilateral amblyopia caused by a distinct refractive error of each eye. Isoametropic amblyopia occurs when both eyes are amblyopic from a significant yet similar refractive error. Severity of the refractive error and the amblyopia are directly related. Anisometropic amblyopia is likely in the presence of 1.0–1.5 D or more anisohyperopia, 2.0 D or more anisoastigmatism, and 3.0–4.0 D or more anisoamblyopia. Bilateral or isoametropic amblyopia may occur in the presence of 5.0–6.0 D or more of amblyopia, 4.0–5.0 D or more of hyperopia or 2.0–3.0 D or more of astigmatism. Amblyopia caused by significant astigmatism is referred to as meridional amblyopia.

Anisometropic amblyopia

Anisometropia is a difference in the state of refraction of at least 1 diopter between 2 eyes. The prevalence of anisometropic amblyopia is about 4.7% in children and may be amblyopic, astigmatic, or hypermetropic. The most common type of anisometropia seems to vary with the age, ethnicity, and ocular pathologies of the analyzed sample. Hypermetropic anisometropia is the most likely type to cause amblyopia, since the retina of the more ametropic eye never receives a clear and defined image: The fovea of the good eye is focused and there will be no stimulus of accommodative effort to adjust the focus of the more hyperopic eye.

Strabismic amblyopia

Strabismus is a deviation of one eye with loss of eye parallelism. As a result, the eyes do not receive equal images, leading the visual system to adapt to this change. When the visual system is completely formed (when the person reaches adulthood), the perception of non-corresponding images by 2 eyes leads to double vision, but when the visual system is in its critical period of development (in childhood), the brain is still capable of using mechanisms to avoid diplopia or rivalry by inhibiting the activation of the retinocortical pathways originating from the fovea of the deviating eye.

Mixed amblyopia

Amblyopia is considered mixed when caused by 2 amblyogenic factors. Combination of anisometropic and strabismic amblyopia is common, especially in partially accommodative esotropia, microtropia, and monofixation syndrome. Clinically, mixed amblyopia is more severe with similar deficits of visual functions, there is an exacerbation of visual acuity loss and contrast sensitivity and typically an extinction of stereopsia. The magnitude of the impact on each visual function will depend on the concomitant onset or at different times of each ocular change.

Reverse Amblyopia

Reverse amblyopia is a result of penalizaton of the sound eye with patching or atropine during amblyopia treatment of the original amblyopic eye. The type of amblyopia and its severity not only adversely affect visual acuity but also binocularity, contrast sensitivity, grating acuity, and central versus eccentric fixation.

Other Cortical Areas and Complex Functions Affected by Amblyopia

Amblyopia is, therefore, a neural disorder resulting from abnormal brain stimulation during the critical period of visual development. As shown by several studies, the striate cortex (V1) is the main cortical area affected by amblyopia. Amblyopes have decreased binocular neurons and decreased neurons responsible for the amblyopic eye in V1 in addition to active binocular suppression. Despite the well-known visual processing deficits, recent work has shown that amblyopic patients present alterationsin visual processing of high-order cortical functions such as deficiency in movement integration, perception and processing of shape and global contour, altered perception of alignment (Vernier acuity), and symmetry. Deficits in tasks involving high-order attention components have also been described as enumeration of objects, prolonged attentional blinking, the "crowding" phenomenon, the reading process, and visual decision-making.

What causes Amblyopia

A number of conditions and factors can lead you to rely on one eye more than the other. These include:

- constant strabismus, or turning of one eye
- genetics, or a family history of amblyopia
- different levels of vision in each of your eyes
- damage to one of your eyes from trauma
- drooping of one of your eyelids
- vitamin A deficiency
- corneal ulcer or scar
- eye surgery
- vision impairment, such as nearsightedness, farsightedness, or astigmatism
- glaucoma, which is high pressure in your eye that can lead to vision problems and blindness.

Signs and Symptoms of Amblyopia

In some cases, children may exhibit symptoms that occur as a result of an underlying pathology causing the amblyopia. These symptoms include:

- A squint - The child may develop a strabismic amblyopia (refer to “Amblyopia types”), characterized by a squint, where the weaker eye is orientated upwards, outwards, downwards or inwards while the normal or “good” eye is facing forwards.
- Cataract - The child may have developed a cataract in one eye, which will appear cloudy or patchy.
- Drooping eyelid - Also called ptosis, one eyelid may be drooping and partly covering the eye.

Other clues that a child may be experiencing vision problems due to amblyopia include:

- Poor ability to judge distance between themselves and an object.
- Poor depth of vision and inability to position themselves well to catch a ball, for example.
- The child may appear clumsy, running into furniture or falling over.
- Older children may find they have better vision in one eye and complain that reading, writing and drawing are challenging.

DIAGNOSING AMBLYOPIA

Visual Acuity Testing

When evaluating for amblyopia, linear acuity is more desirable than single optotype presentation because single optotype presentation underestimates the degree of amblyopia. Surround bars have been used to create crowding in a single optotype and are useful in children who get confused with the multiple optotypes used in linear acuity testing. There are many ways to test visual acuity in preschool children, including Allen picture figures, LEA figures, HOTV, illiterate E game, and the recently developed Wright figures. The Wright figures are composed of black and white bars with a constant gap throughout the figure. A recent study using the Wright figures on the Portal Stimuli System (Haag-Streit) found that the Wright figures tested two-point discrimination acuity, similar to Snellen acuity

Fixation Testing for Amblyopia

Preverbal children can be tested for amblyopia by examining the quality of monocular fixation or binocular fixation preference.

MONOCULAR FIXATION TESTING

Normally developed children more than 2 to 3 months of age should show central fixation with accurate smooth pursuit and saccadic refixation eye movements. Test for central fixation by covering one of the patient’s eyes, then move a target slowly back and forth in front of the child to observe the accuracy of fixation. A child with central fixation looks directly at the target, visually locks on the target, and accurately follows the moving target. Infants often find the human face a much more compelling target than toys or pictures, so try moving your head side to side to evaluate the quality of fixation. Central fixation indicates foveal vision usually in the range of 20/100 or better.

ECCENTRIC FIXATION

Eccentric fixation means the fovea is not fixating and the patient is viewing from an extrafoveal part of the retina. Patients with eccentric fixation appear to be looking to the side, not directly at the fixation target. They have poor smooth pursuits, so they do not accurately follow a moving target.

VISUSCOPE

One way to identify the eccentric fixation point in older cooperative children is to use a Visuscope, which is a type of direct ophthalmoscope that projects a focused image onto the retina so the examiner can see the image on the retina. First, the image is projected onto the parafoveal retina, then the patient is asked to look at the image. If the patient has central fixation, the patient refixates to place the image precisely on the fovea. However, with eccentric fixation, the patient will view with the parafoveal retinal area and show a wandering, unsteady fixation. The more peripheral the eccentric fixation, the denser the amblyopia.

FIXATION PREFERENCE TESTING

Testing for fixation preference is useful in preverbal strabismic children to identify amblyopia that might be missed by monocular fixation testing. It is based on the premise that strong fixation preference indicates amblyopia. If a patient with strabismus spontaneously alternates fixation, using one eye, then the other, this indicates equal fixation preference and no amblyopia.

VERTICAL PRISM TEST (INDUCED TROPIA TEST, 10 DIOPTER FIXATION TEST)

The vertical prism test is used in preverbal children with straight eyes or small-angle strabismus to accurately diagnose amblyopia. It is performed by placing a 10 to 15 PD prism base-up or base-down in front of one eye, thereby inducing a vertical tropia. With the induced vertical strabismus, fixation preference can be determined. A base-down prism is placed over the right eye. The right eye is fixing because both eyes move up as the right eye fixates through the prism. The prism is placed over the left eye, but the patient still fixates with the right eye, evidenced by the fact that both eyes are in primary position, ignoring the prism in front of the left eye.

CROSS-FIXATION

Patients with a large-angle esotropia and tight medial rectus muscles will have difficulty bringing the eyes to primary position, so the eyes stay adducted. These patients "cross-fixate." The right adducted eye fixes on objects in left gaze, and the left adducted eye fixates on objects in right gaze. Cross-fixation has been said to be a sign of equal vision, but cross-fixation does not guarantee that a patient sees equally with each eye. The ability to hold fixation past midline or to hold fixation through smooth pursuit with either eye is a better criterion for equal vision.

LATENT NYSTAGMUS

Patients with strabismus often have latent nystagmus, which is a horizontal jerk nystagmus that occurs or gets worse in both eyes if one eye is occluded. Thus, covering one eye in a patient with latent nystagmus will increase nystagmus and diminish visual acuity. To evaluate monocular visual function, blur one eye with a plus lens rather than occluding one eye. Blurring one eye induces less nystagmus than occlusion. Use the minimum amount of plus necessary to force fixation to the fellow eye. The vertical prism test can identify which eye is fixing. Usually, a +5.00D lens is sufficient to blur distance vision enough to force fixation to the fellow eye. Linear presentation of optotypes is difficult for patients with nystagmus because the optotypes tend to run together, so try a single optotype presentation.

Treatment of Amblyopia

- Optical correction of significant refractive errors
- Patching
- Pharmacological treatment
- Refractive surgery
- Alternative therapies

Optical correction

Treatment of refractive error alone is the initial step in care of children 0-17 years of age with amblyopia. Refractive error correction and compliance with the refractive correction is a challenge for patients with one eye having good visual acuity compared with other as many patients with this anisometropic or ametropic amblyopia reject the use of glasses. In such cases where the consistent use of glasses is difficult, surgical correction of refractive error is successful in achieving visual improvement.

Patching

It is initiated for children who do not improve with eye glasses alone. The amblyopia treatment study (ATS) found that 6 h of prescribed daily patching produces an improvement in visual acuity that is similar in magnitude to full time occlusion therapy prescribed for treating severe amblyopia (20/100 to 20/400) in children under 7 years of age. In children who have moderate amblyopia (20/40 to 20/80), initial therapy of 2 h of prescribed daily patching produces an improvement in visual acuity that is similar in magnitude to the improvement produced by 6 h of daily patching. The treatment benefit achieved by the patching appears stable through at least 15 years of age.

Pharmacological treatment

Cycloplegia

Pharmacological treatment that produces cycloplegia of the nonamblyopic eye can be considered for children who do not improve with eye glasses alone or compliance to patching is low due to various reasons, presence of latent nystagmus, or maintenance therapy. It works best when the nonamblyopic eye is hyperopic. The cycloplegia optically defocuses the nonamblyopic eye. The benefit achieved by pharmacologic treatment remains stable through 15 years of age.

Levodopa-Carbidopa

The increasing levels of dopamine may improve vision in the context of amblyopia. Some investigators have reported that levels of retinal dopamine are decreased in deprivation amblyopia. There have been several clinical trials that have evaluated the use of levodopa across a range of patients. PEDIG investigators organized a randomized trial of levodopa for the treatment of amblyopia in an older cohort of patients (children aged 7–12 years). When prescribed daily levodopa with carbidopa in addition to continued 2 h/day of patching, no clinically significant or meaningful improvement in VA was seen in a different prospective trial with a larger cohort of patients. They reported statistically significant visual gains sustained at 1 year of follow-up for children; however, the levodopa dosage was three times higher than in the PEDIG study.

Fluoxetine

Fluoxetine is a selective serotonin reuptake inhibitor, used as antidepressant. It acts by altering the cortical expression of various heat shock proteins and neurofilaments which are important for synaptic functions demonstrated an increase in the percentage of synapses with split postsynaptic densities, a phenomenon characteristic of activity-dependent synaptic rearrangement on electron microscopic analysis. The chronic administration of fluoxetine promotes the recovery of visual functions in adult amblyopic animals by reducing the intracortical inhibition and increasing the expression of brain-derived neurotrophic factor in the visual cortex, both of which are prevented by cortical administration of diazepam.

GABA antagonists

Monocularly deprived experimental animals have been shown to have lack of responsiveness to visual stimulation of the deprived eye. Various experimental studies have been conducted to establish the possible etiology. The evaluated various agents to reverse the effects of monocular deprivation including GABA antagonists such as bicuculline, picrotoxin, and naloxone, glycine antagonist such as strychnine, chloride channel blockers such as ammonium ion and cholinesterase inhibitor, physostigmine. The drugs were administered through intravenous route. The study found that drugs with GABA antagonistic action were effective in restoring neuronal responsiveness in the deprived eye. Bicuculline restored binocularity in 50% of the visual cortical neurons tested and naloxone in up to 36% neurons.

Cytidine 5'-diphosphocholine, CDP-choline, or citicoline

Citicoline is an intermediate by-product involved in the biosynthesis of cell membrane phospholipids. Following systemic administration, it gets degraded into its constituents, cytidine and choline. Citicoline, once absorbed, crosses the blood–brain barrier and gets incorporated into the cell membrane phospholipids. It has been shown to increase the levels of norepinephrine and dopamine levels in CNS, offering neuroprotection in hypoxic and ischemic conditions. In addition, citicoline has been shown to restore the activity of mitochondrial ATPase and membrane Na^+/K^+ ATPase, thereby accelerating resorption of cerebral edema in various experimental models. It has been shown to inhibit apoptosis in neurodegenerative models, thereby potentiating neuroplasticity.

Atropine drops therapy

In some children, atropine eye drops have been successfully used to treat a lazy eye. One drop is placed in your child's good eye each day. Your eye doctor will give you instructions how to do this. Atropine blurs the close-up vision in the good eye, which forces your child to use the eye with amblyopia more, thereby strengthening the "lazy" eye without having to wear an eye patch on the good eye. One advantage of using atropine eye drops to treat lazy eye is that it doesn't require constant vigilance to make sure your child is wearing their eye patch.

Other drugs

Ongoing clinical trials with drugs targeting the neuromodulatory systems show promise for amblyopia treatment in adult patients. Selective serotonin reuptake inhibitors (SSRI) treatment has been shown to augment visually-evoked potentials (VEPs) in normal human subjects. In a few adult patients with amblyopia, SSRI (citalopram) enhanced visual acuity improvements when combined with two weeks of occlusion therapy, but effects in the population were not significantly different from placebo. Another study pairing SSRIs with video game training demonstrated that while video games improved visual acuity, no added value of the SSRI treatment was observed.

Refractive surgery

Refractive surgery has demonstrated benefits for the population of children with refractive amblyopia who are noncompliant with spectacle wear or nonresponsive to standard treatment in multiple case series. Evidence also suggests that correction of ametropia in children with neurobehavioral disorders that preclude spectacle correction improves not only vision but also global functioning. Clear lens extraction has shown some benefit, but not the robust gains that PRK and pIOL treatments have demonstrated. While there are no randomized controlled trials to support widespread adoption of these techniques, PEDIG is currently planning Amblyopia Treatment Study 19, which is a controlled randomized clinical trial that will compare PRK versus nonsurgical treatment of anisometropic amblyopia in children who have failed conventional treatment.

Alternative Therapies

Vision therapy

Vision therapy (also termed "orthoptics" or eye exercises) is defined as a doctor-prescribed, nonsurgical program of visual activities to improve visual acuity and binocularity. These include computer programs, prisms, filters, metronomes, vergence activities, accommodation activities, antisuppression activities, and eye-hand coordination exercises. These are often conducted in an office setting with a therapist, supplemented with home exercises. These treatments have also been promoted for the treatment of amblyopia as an adjunct to patching. However, there is insufficient evidence to recommend vision therapy techniques.

Perceptual learning
Perceptual learning was defined in 1963 by Eleanor Gibson simply put as performance on simple visual tasks shows improvement with practice in adults. The perceptual learning in adult amblyopes can augment visual function. Improved pretest to posttest performance and gains in visual acuity (VA) were reported when subjects participated in a learnt trial of Gabor signals in a series of 77 adult amblyopes. The neural basis for this is postulated to result from a reduction in lateral inhibition within the brain with training.

Binocular therapy/dichoptic therapy
Binocular therapy has been used to treat amblyopia in children with no strabismus or small-angle strabismus with some binocularity. Images are presented dichoptically; high-contrast images are presented to the amblyopic eye and low-contrast images are presented to the fellow eye. The binocular treatment was adapted to an iPad® device as a "falling blocks" game, which uses red--green anaglyphic eyeglasses to allow dichoptic presentation. Although early nonrandomized studies were promising, results from a recent randomized trial failed to demonstrate that game play prescribed 1 h per day was as good as patching prescribed 2 h per day.

Corrective lenses and glasses
In cases of refractive amblyopia (lazy eye due to unequal refractive errors), normal vision can be achieved simply by fully correcting the refractive errors in both eyes with glasses or contact lenses. Usually, however, at least some patching of the "good" eye is needed to force the brain to pay attention to the visual input from the "lazy" eye and enable normal vision development to occur in that eye.

Use of microsensor therapy
There is a commercially available 8 × 12 mm small Thera Mon microsensor (Thera Mon®-Chip, MC Technology GmbH). This sensor allows a simple objective documentation of the therapy compliance of patches and glasses. It samples the surrounding temperature in regular intervals. Due to the specific temperatures, it is possible to detect the time of application and, therefore, the compliance. Therefore, Thera Mon microsensor could be a study-related approach for monitoring the compliance and further leading to possible improvement of application time protocols in amblyopia therapy.

Risk factors
Factors associated with increased risk of lazy eye include:

- Not getting a comprehensive eye exam to detect condition by 6 months of age and again at 3 years of age.
- A high prescription that has gone uncorrected with glasses or contacts.
- Family history.
- Premature birth.
- Developmentally disabled.
- Eye turn—also referred to as strabismus (one eye turned out or in).
- Visual deprivation of one eye—congenital cataract, ptosis and/or corneal opacities.
- Large refractive errors.

Mitigating the Impacts of the COVID -19 Pandemic
The following important areas to mitigate the impact due to COVID-19 pandemic in people living with amblyopia.

Social restrictions
A study on the impact on the transmission of COVID-19 with a social distancing measure reported a substantial reduction in the transmission of COVID-19. Individuals with amblyopia (low vision and blindness) are motivated to ensure social or physical distancing or to avoid crowded areas and restrict social movement, and to stay at home during the COVID-19 pandemic. If there is a need of going outdoor movement, the mobility long cane can be used to maintain the social distance norm, or if he or she requires a sighted guide for a short distance movement, then requesting the sighted person to hold the other end of cane (not at the tip) will be a better option rather than direct body contact.

Personal factors
As a policy of lockdown, the Government of India advises certain measures to be implemented at the individual levels. For example, wearing face or cloths masks, frequent hand wash with soap, limits unnecessary physical contact to others and surfaces with potentially contaminated, avoid touching to nose or eyes, etc. These measures are to minimize the risk of exposure to the virus causing the COVID-19. Therefore, it is important to adopt such new behavioural aspects in the best possible way during the pandemic in people with amblyopia. Meanwhile, it is also critical to ensure their preferences and values when implementing such a personal behavioural change. Proper education, counselling and training need to be done keeping in mind their dignity and their unique ability.

EFFECTS OF KEY ENVIRONMENTAL FACTORS ON AMBLYOPIA

Some of the important environmental factors that can lead to amblyopia and associated problems during post -covid quarantine period. They include:

Near Work and Education
In school going children, amblyopia has long been found to be associated with increased levels of book reading and near work in dim light. Indeed, numerous studies conducted across a range of different populations have

consistently found that higher levels of education are associated with a higher prevalence of amblyopia. Continuous reading (>30 minutes) is also an important factor that contributed to amblyopia. This can be interpreted in the context of current theories of amblyopia as a close reading distance may provide a source of hyperopic defocus to the eye and, in conjunction withaccommodativeresponses in susceptible individuals, could promote eye growth.

Screen Time

Increase in online learning and screen time has enhanced the time spend on near work during post covid era increasing the risk of amblyopia onset and progression in children. Studies have an association between increased computer use and amblyopia. Use of the smartphone screen, has also been found associated with amblyopia. However, association with television viewing and amblyopia has not been established. Some reports suggest that watching televisioninduced a transient amblyopia that may lead to the development and progression of permanent amblyopia.

Light Exposure and intensity

A number of recent studies report that the time children spend engaged in outdoor activities is negatively associated with their risk of amblyopia. Spending time outdoors for a period of at least >2 hours/day has been reported to down regulate the progression of amblyopia, however in post - covid scenario the outdoor activities in children have become highly restricted. This might have adverse impact on progression of the disease. Reports suggest that the mechanisms through which outdoor light might protect against amblyopia, may include (a) stimulation of intensity- or wavelength-dependent anti-amblyopia systems in the retina, (b) sustained pupillary constriction via the melanopsin system – that may improve the retinal image quality by reducing longitudinal aberrations, (c) increase the production of vitamin D.

Nutrition

COVID-19 has become global public health nightmare as lockdowns led to diet and lifestyle changes. Studies have suggested that there have been low levels of physical activity and perceived weight gained during the lockdown period. School environment provide structure and routine around meal times that provide protection against obesity. Closure of school during Covid -19 pandemic is likely to have collateral effect on body weight of children as they had less chance for continuing exercise. BMI has been associated with an increased prevalence of amblyopia. Scientists have shown that heavier individuals have tendency of becoming hyperopic. Reports suggest that accumulation of retro-bulbar fat prevents expansion by limiting the orbital space.

Routine childhood Immunisation during the COVID-19 pandemic

At the eye level

- Wear spectacles as prescribed by the doctor.
- Put a screen saver or pop-up in the gadget to remind you to blink adequately. People often forget to blink while staring at screens leading to dryness of eyes followed by irritation.
- Give breaks to eyes after 20-30 minutes by palming or looking at a distant object or take a 10-minute break from the screen after one hour of use.
- Maintain a distance of at least a foot away from the gadget when sitting straight.

At the gadget level

- Children often use different gadgets like desktops, laptops, mobile phones but they tend to disregard the positioning of these gadgets, lighting from the gadgets and the surroundings which can lead to fatigue, neck and back pain apart from the eye problems.
- Keep the monitor slightly below eye level as too high or low a position can cause neck pain. Too high a position also makes children open their eyes more leading to evaporation of tears
- Children tend to forget about brightness levels as it is mostly set according to the needs of adults who use them often. Keep brightness low compared to surrounding and removing or rearranging glare sources can help avoid eye strain.

Few tips to keep your eyes safe

1. Take a break from work

Take a break from looking at a screen every 15-20 minutes and close your eyes for a few seconds. Massage the muscles around your eyes or wash your face in every two hours. At the same time, remember not to rub your eyes with your hands. If your eyes are dry, blink more.

2. Being mindful using the screen

If you are going use the screens, try to use this time for something useful like learning a new exercise regime or learning a new craft. This way you limit your screen time because you will be more focused on other activities.

3. Spending time with your family

Spend time with your pets, your parents or siblings. Spending time together will help you feel good and keep you distracted away from phone and laptops. Play indoor game which will also keep you entertained.

4. Eat a healthy diet

Almonds, walnuts, fish and citrus fruits are some foods good for your eyes. A well balanced diet also helps you stay at a healthy weight that lowers your odds of obesity and related diseases like type 2 diabetes which is the leading cause of blindness in adults.

5. Work under good light

Avoid working under dim or fluorescent light or in a dark room. While working and reading in low light won't cause a decline in vision but it can lead to eye strain.

New Perspectives in Amblyopia

The study of amblyopia over the years has allowed better understanding of brain function. The anatomical and functional structure of the visual system has been studied in further detail, through new models and with more advanced technology, attempting to correlate findings with electrophysiological data, psychophysical data, and now neuroimaging data.

The anatomical and functional alterations in the primary visual cortex due to amblyopia in animal models, much has been discovered about the impact of amblyopia on the visual system and the importance of a critical period of cerebral plasticity on the effective treatment period. Two major shifts in paradigm regarding amblyopia that these bodies of work brought were the belief that successful treatment of amblyopia outside the critical period is possible, and the concept that amblyopia is more of a binocular, rather than a monocular, disease.

Treatment of amblyopia outside the critical period

We know that the young brain is more plastic than an adult brain, but we also know that the adult brain is still capable of learning and recovering after injury, so it is clear that there is plasticity at a synaptic level, a cellular level, and at the level of cortical representation. One interpretation in this context is that the critical period ends with an increased threshold for plasticity rather than complete closure, so it is necessary to find stimuli and ways to stimulate the specific plasticity of the adult brain. Intracortical inhibitory circuitry was discovered as a key factor for defining the limits of cortical plasticity.

Amblyopia as a binocular disease

Amblyopia typically affects visual acuity in one eye, and was always considered a monocular disease. For this reason, the main treatment has been occlusion of the fellow eye to improve the monocular function of the amblyopic eye. However, there are now a large number of studies showing that the deficit in amblyopia extends beyond monocular visual acuity impairment and into higher-order function such as binocular vision, fixation instability, and visuomotor activities due to abnormal interocular interactions. The common factors in those additional deficits in amblyopia are that they are not acuity-limited tasks; they require integration of information over relatively large regions of space and/or time, and they involve extracting a signal from noise.

CONCLUSION

The unprecedented scale of the COVID-19 pandemic has disrupted our lives beyond recognition. While the world reels from the global impact of COVID-19, governments are also making adjustments to allow for everyday life to continue, such as the closure of schools with the education of our school children using online platforms. In this regard, digital technology has been immensely beneficial in cushioning the disruption to school education, but it is crucial to be cognizant of the impact of increasing dependence on digital devices. While it is important to adopt strict measures (e.g., lockdown and home quarantine) to slow or halt the spread of COVID-19, multi-disciplinary collaboration and close partnerships between ministries, schools and parents are necessary to minimize the long term collateral impact of COVID-19 related policies on various health outcomes such as amblyopia, which was already a major public health concern prior to the pandemic.

Increased digital screen time, near work and limited outdoor activities were found to be associated with the onset and progression of amblyopia, and could potentially be aggravated during and beyond the COVID-19 pandemic outbreak period. While school closures may be short-lived, increased access, adoption and dependence on digital devices could have a long term negative impact on childhood development. Raising awareness among parents, children and government agencies is key to mitigating amblyogenic behaviours that may become entrenched during this period.

REFERENCES

1. https://indianexpress.com/article/parenting/health-fitness/covid-19-lockdown-how-parents-can-ensure-their-childs-eye-health-6360178/
2. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7331493/
3. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4848013/?report=reader
4. https://pubmed.ncbi.nlm.nih.gov/32738229/
5. https://www.practiceupdate.com/content/digital-screen-time-during-covid-19-pandemic-risk-for-a-further-myopia-boom/104538
6. https://www.ijo.in/article.asp?issn=0301-4738;year=2020;volume=68;issue=7;spage=1367;epage=1370;aulast=Senjam
7. https://www.ijo.in/article.asp?issn=0301-4738;year=2020;volume=68;issue=7;spage=1496;epage=1496;aulast=Sumitha
8. https://www.ndtv.com/health/digital-eye-strain-during-lockdown-follow-these-expert-tips-to-keep-your-eyes-safe-2221115
9. https://scholar.google.co.in/scholar?q=related:MTud1EfMFzcJ:scholar.google.com/&hl=en&as_sdt=0,5#d=gs_qabs&u=%23p%3DxpXWweHYukQJ
10. https://www.aao.org/disease-review/types-of-amblyopia
11. https://www.aao.org/disease-review/amblyopia-types-diagnosis-treatment-new-perspectiv
12. https://www.seevividly.com/info/Lazy_Eye/Amblyopia
13. https://www.optometrists.org/vision-therapy-for-lazy-eye/amblyopia-lazy-eye/
14. https://www.allaboutvision.com/conditions/amblyopia.htm

15. https://www.aoa.org/healthy-eyes/eye-and-vision-conditions/amblyopia?sso=y
16. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5602150/
17. https://bjo.bmj.com/content/102/11/1492
18. https://www.news-medical.net/health/New-hope-for-adults-with-amblyopia.aspx
19. https://www.djo.org.in/articles/29/4/update-on-diagnosis-and-management-of-amblyopia.html
20. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3223381/