



# SURVEY REPORT ON DIGITAL EYE STRAIN (DES)

**Miss. Srushti S. Rodge<sup>1</sup>, Dr. V.P. Wankhade<sup>2\*</sup>**

<sup>1</sup>Department of Chemistry, Vidyabharti College of Pharmacy, Amravati (MH) India, 444-602

<sup>2</sup>Assistant Professor, Vidyabharti College of Pharmacy, Amravati (MH) India, 444-602

## ABSTRACT

Screen time is the amount of time spent using a device with a screen such as a smartphone, computer, television, or video game console. The concept is under significant research with related concepts in digital media use. Too much screen time can lead to obesity, sleep problems, chronic neck and back problems, depression, anxiety and lower test scores in children. Spending too many hours staring at a screen can cause eye strain which leads to the computer vision syndrome also called digital eye strain. You tend to blink less while staring at the blue light from a screen, and the movement of the screen makes your eyes work harder to focus. We typically do not position the screen at an ideal distance or angle, which can cause added strain. All these issues add up and can lead to lasting effects on your vision, especially in children. This survey study was conducted on 200 people who parent of children below age 15 and adults who work from home and students who spend their time online for education and other purposes during and after COVID pandemic. The majority of people suffer from screen time effect by experiencing fatigue in eyes as well as some eye problems like eye irritation, eye redness. This survey study upholds the concepts of causes, symptoms and also the information related to screen time effects causes DES. Some rules for avoid the screen time effect to appropriate treatment for eye. Screen time of digital gadgets are widely used hence we need to get some precautions for avoid the eye damage and set some rules for it.

**KEYWORDS:** COVID-19 period, Digital-Eye-Strain, Computer-Vision-Syndrome, Severity, Rules-for-DES.

## Introduction:

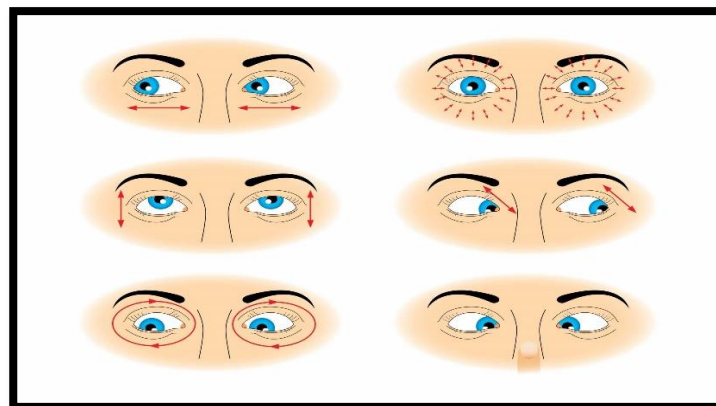
- **Screen time and its History:**<sup>1</sup> Screen time is the amount of time spent using a device with a screen such as a smartphone, computer, television, or video game console. The concept is under significant research with related concepts of eye strain. Screen time is correlated with mental and physical harm in brain development. The positive or negative health effects of screen time are influenced by levels and content of exposure. To prevent harmful exposure to screen time to eyes, some governments have placed regulations on

its usage. Screens are now an essential part of entertainment, advertising, and information technologies. A survey found a median of 4.7 hours per day of screen time over a 30-days period leads to digital eye strain (DES).

- **Effect of DES:**<sup>2</sup> All forms of screens are frequently used by **children and teens**. Nationally representative data of children and teens in India shows that the daily average of screen time **increases** with age. **TV and video games** were once largest contributors to children's screen time, but the past decade has seen a shift towards **smart phones and tablets**. Specifically, before the covid period survey of parents of children from birth to age 8 suggests that TV accounted for **51%** of children's total daily screen time, while mobile devices only accounted for **4%**. However now a days TV dropped down to **42%** of children's total daily screen time, and mobile media devices jumped up to **35%**.
- **Coronavirus and screen time:**<sup>3</sup> The COVID-19 pandemic increased screen time as people stayed indoors, adding to concerns about the effects of excessive screen time, Specialists called for limiting screen time which will help the shorten the strain on eye.
- **Screen Time and Eyes:**<sup>4</sup> Most of the people know the sun can hurt eyes but are less clear on whether to worry about other bright lights, like computer screens. In short, these screens are far less damaging than the sun. This is because screens are not as bright as the sun and newer screens do not generally produce UV rays, the most damaging kind of light the produce is short wavelength, high energy blue light. Blue light is mostly associated with potentially causing eye strain.

Vision experts generally do not consider screens as a source of permanent vision damage, even if extended use can cause eye irritation. Staring at screens for a long time is known to sometimes cause **computer vision syndrome** or **digital eye strain**. While not serious this condition can still be irritating and even detrimental to one's work.

An ophthalmologist advice to reduce the irritation of eye by shorting the screening time in the duration of 20 minutes as well as some eye exercises.



**Fig No. 1 Eye Exercises for relief from fatigue**

## Literature Review:

Screens are a part of everyone's life these days. While there is growing evidence showing the negative effects of screen time on adults and children.

### 1. Causes:<sup>5</sup>

- Indoor activities on screen.
- Playing online video games.
- Watching too much TV.
- Watching mobile for social media suffering.
- Work from home.
- Online teaching, etc.

### 2. Symptoms:<sup>6</sup>

- Eye fatigue (Asthenopia).
- Loss of focus flexibility.
- Nearsightedness (myopia) and farsightedness (hypermetropia).
- Sore, burning or itching eyes.
- Watery or dry eyes.
- Blurred or double vision.
- Increased sensitivity to light, called photophobia.
- Feeling that you cannot keep your eyes open.

3. **Anatomy of eye:**<sup>7</sup> Eyes are **organs that allow you to see**. They take in light from the world around you and send visual information to your brain. Your eyes can see about 200 degrees in all directions, including in front of you and to the sides (peripheral vision). Parts of your eyes work together to allow you to see images, movement and depth.

Your eyes can see millions of colors in varying shades. Many conditions can affect how your eyes work, including common vision problems like myopia (nearsightedness), astigmatism and eye injuries. Several diseases and disorders that are not necessarily eye-related can cause problems in the eyes, including autoimmune disorders, diabetes and high blood pressure. To keep your eyes healthy, you should see your provider for regular eye exams. Eat a balanced diet, maintain a healthy weight and avoid smoking, which can damage your eyes. Always wear protective eyewear to prevent injuries, especially during contact sports or if you have a job working with tools that could potentially lead to eye injuries (welding, metalwork, woodworking, etc).

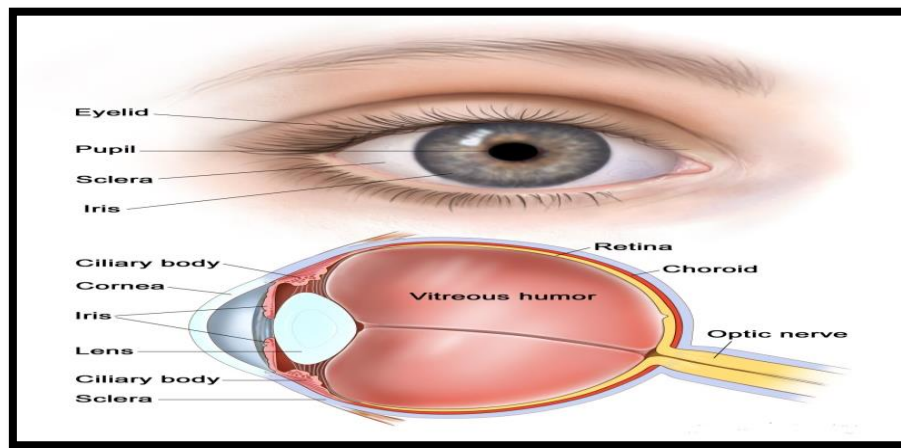


Fig No.2 Anatomy of eye

Your eye is the shape of a ball that's slightly compressed. It's not quite a perfect sphere because it's a little more pointed in the front. In adults, the eye is about 1 inch in diameter. Eye colors vary, from blue, green or amber to all shades of brown. Some people have flecks or stripes of different colors in their irises. They may also have a darker ring of color around their irises. The color of your eyes depends on your genes.

#### 4. Effect on Eye Health:<sup>8</sup>

- **Eye fatigue:** Eye fatigue called **asthenopia** is characterized by eye discomfort, dimness of vision and headache. Asthenopia can be caused by overuse of the eye, for example during a period of prolonged **focus on a screen**. Any glare on the screen can further strain the eyes. Eye fatigue may cause of **headaches, eye pain, or feeling tired**. They may lose interest in tasks such as reading.
- **Dry and irritated eyes:** The eyes can also get dry and irritated during long stretches of screen use. People of all ages blink far less often when concentrating on a screen, which in turn causes the eyes to dry out. A clear and stable tear film on the eye surface is essential for clear vision. This problem can be worse for children who may have to look up at a screen that's positioned for adult use.
- **Loss of focus flexibility:** When children's eyes stay focused close-up for long periods, they can find it difficult to adjust to distance vision later. Generally, that's a short-term problem, and the eyes adjust back to their normal flexibility.
- **Nearsightedness:** Kids who are on screens are typically indoors. "Exposure to natural daylight is critical to developing eyes," says Malik. "Kids need time playing outside for their health, but also for their eyes." Studies have found that children who spend more time indoors are more likely to develop nearsightedness (myopia). The exact process is still being studied, but researchers believe UV light (as long as the eyes are protected

from intense sunlight) plays an important role in healthy eye development. The rate of nearsightedness in children has increased dramatically in the past 30 years.

## 5.Treatment:<sup>9</sup>

a. Home Remedies: Some Home Remedies can help treat and prevent itchy eyes due to digital eye strain:

- applying warm and cool compresses.
- keeping the eye area clean.
- using a humidifier.
- avoiding allergens.
- using eye drops.
- following the 20-20-20 rule.



Fig No. 3 20-20-20 Rule for eyes

## b. Medication:

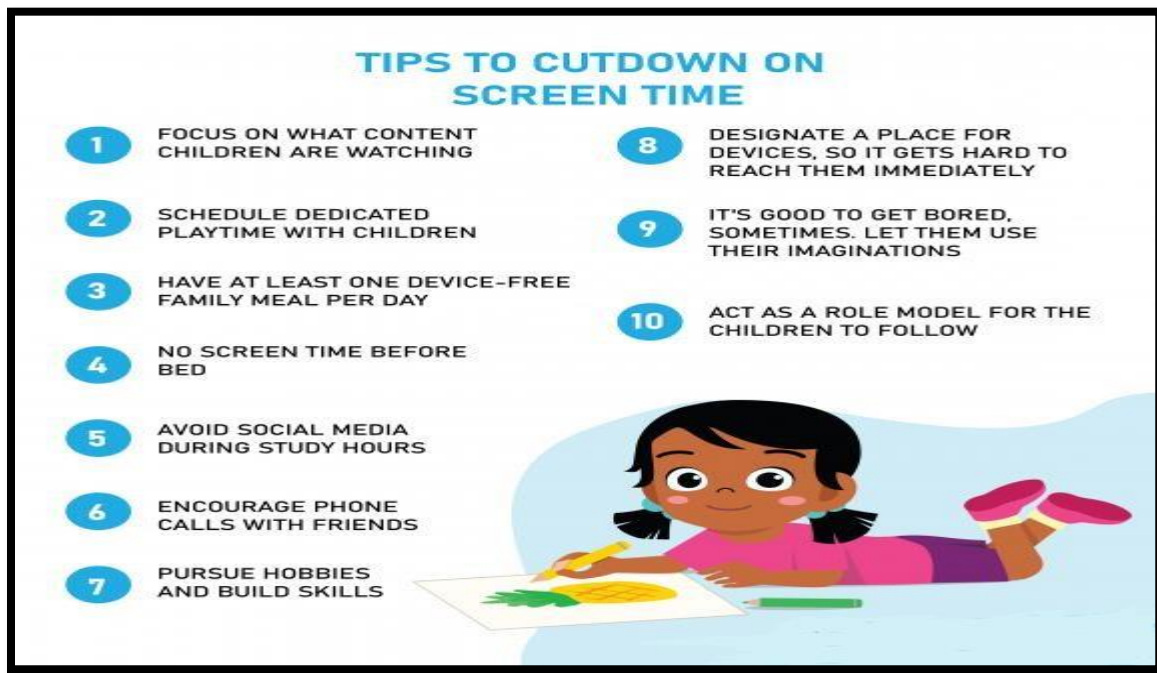
- **Allopathic Eye Drop:<sup>10</sup>**
  1. Carboxymethylcellulose Sodium, N-Acetyl Carnosine, Glycerin, and Boric Acid Eye Drops.
  2. Naphazoline, CPM, CMC, Camphor Eye Drops
  3. Potassium Iodide, Sodium Chloride, Calcium Chloride Eye Drops
  4. Polyethylene Glycol, Propylene Glycol Eye Drops
- **Ayurvedic Eye Drops Extract:<sup>11</sup>**
  1. **Rose:** The antiseptic and antibacterial properties of rose help to reduce the discomfort caused by pollution and dust to the eyes. It act as an organic cleanser and helps to remove the dust particles from the eyes. Plus, it soothes your tired and irritated eyes.

2. **Punarnava:** This herb is used in Ayurveda because of its multiple health benefits. The juice of Punarnava root is helpful for curing a number of eye infections and problems like conjunctivitis etc. It also helps to improve the eyesight.
3. **Daruhaldi:** Its stem helps to refresh and relax the eyes thereby giving a soothing effect. Along with this, Daruhaldi helps to reduce pain and inflammation and other eye related disorders.
4. **Honey:** This natural ingredient has various benefits for eyes. Honey helps to treat dryness, puffiness and infection. It also helps to keep the eye muscles healthy and gives relief from aching eyes.
5. **Triphala:** Triphala is a rich source of vitamin C and antioxidants. It helps to make the eye muscles stronger and protect the eyes against oxidative stress. Triphala also helps to reduce problems like inflammation, redness and eye strain.
6. **Neem:** In Ayurveda, neem is a well-known medicinal herb. Both bark and leaves of Neem has antibacterial properties which help to prevent any sort of infection. It is helpful for curing eye troubles like redness, irritation and tiredness.
7. **Turmeric:** Curcumin, an active ingredient of turmeric, has anti-inflammatory and antiseptic properties. That is why the extracts of turmeric root is used to reduce the swelling in the middle layer of the eye and infections of eye.
8. **Tulsi :** The rich extract of Tulsi leaves gives a soothing effect and reduces eye strain. It also helps to give protection from conjunctivitis, boils and other problems of eyes.
9. **Mint :** The vitamin A of mint helps to maintain a healthy and sharp eyesight. Plus it has antiseptic, antibacterial and antimicrobial properties. Its soothing properties relax the eyes.

## 6.Prevention:<sup>12</sup>

- a. Reevaluate your workspace ergonomics.
- b. Adjust the lights.
- c. Blink more often.
- d. Take regular breaks.
- e. Try blue light blocking glasses.
- f. Get regular eye exams.





**Fig No. 4 Prevention by setting Rule for Children**

## Aim and Objectives:

**Aim:** A survey report on Digital Eye Strain (DES).

## Objective:

- To find the screen time by users (children, adults).
- Analysis the effects and prevention of screen time.

## Methodology:

1. **Study Design:** This study was questionnaire base survey which is undertaken in Amravati Urban Area. Questionnaire which used is developed by using earlier reports and knowledge of related topic.
2. **Study procedure:** Questions were asked to participants from questionnaire and forms were filled as per their answers. Data collected through questionnaire was utilized for further analysis.
3. **Study Population:** 200
4. **Questionnaire:**
  - i. How much time you spend on mobile/ computer?
  - ii. When you get spectacle?
  - iii. Is your eye number is increasing quarterly?
  - iv. Are you facing myopia/ hypermetropia?
  - v. Do you feel any strain on eye after long screen time?
  - vi. Do you know the symptoms of DES?
  - vii. What will you do to cure eye straining?

- viii. Which drop you use for eye irritation/ infection?
- ix. How will you prevent DES?

### Results:

- i. In the given data we can see that majority of people's screentime is at least 2 hours, people who work from home had screentime of at least 8 hours a day.

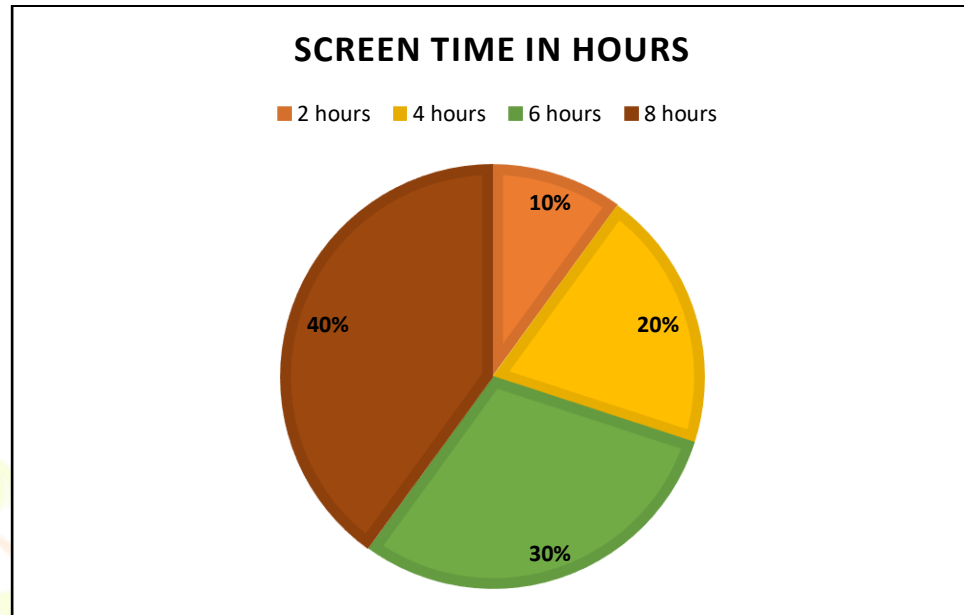


Fig no. 5 – screentime of people

- ii. Most of the people faced eye sight problems during and after COVID period and hence they get spectacles. The number is increasing yearly.

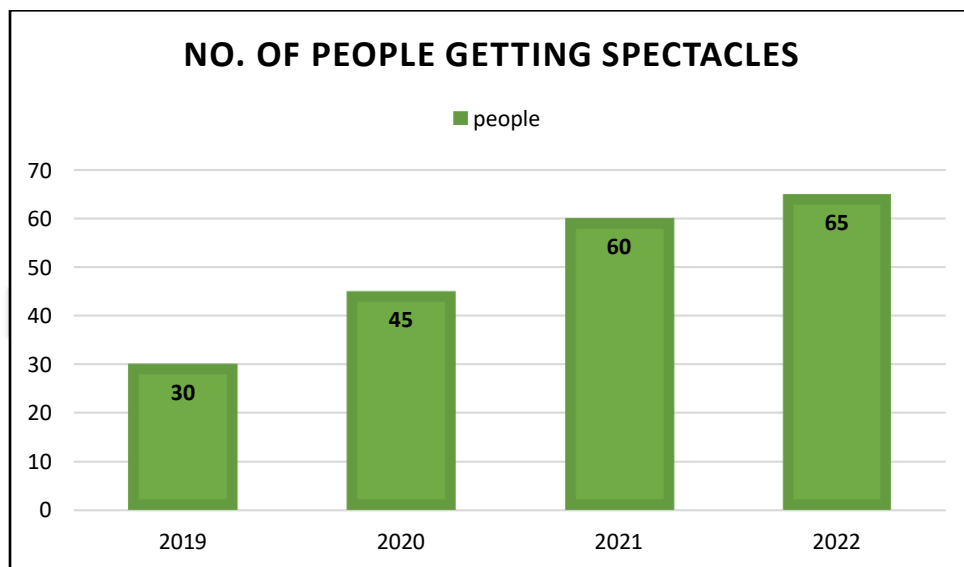


Fig no. 6 – No. of people getting spectacles during & after Pandemic

- iii. As per the survey result, we can see that most of the people's eye number is changing quarterly.



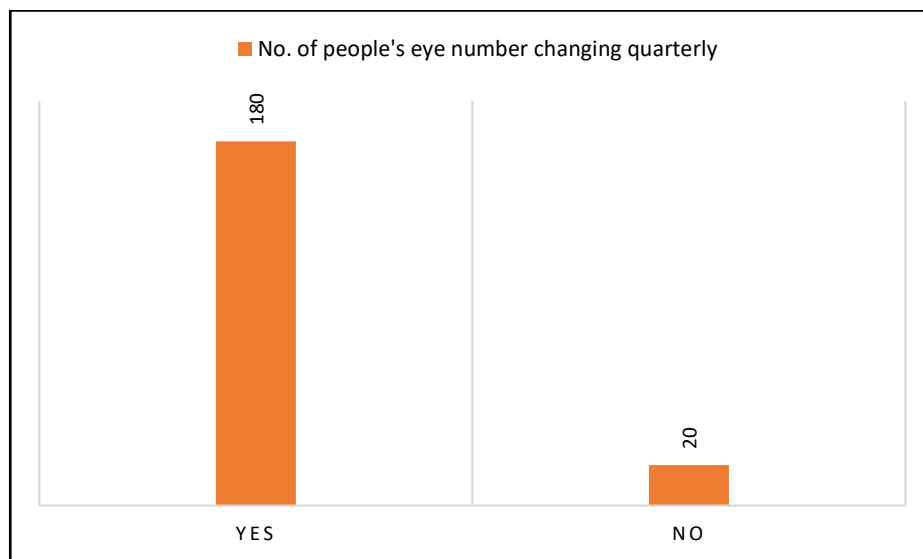


Fig no. 7 – No. of people's eye number changing quarterly

- iv. As per the survey results, majority of people are facing myopia because of more screening time on devices, especially children during COVID pandemic.

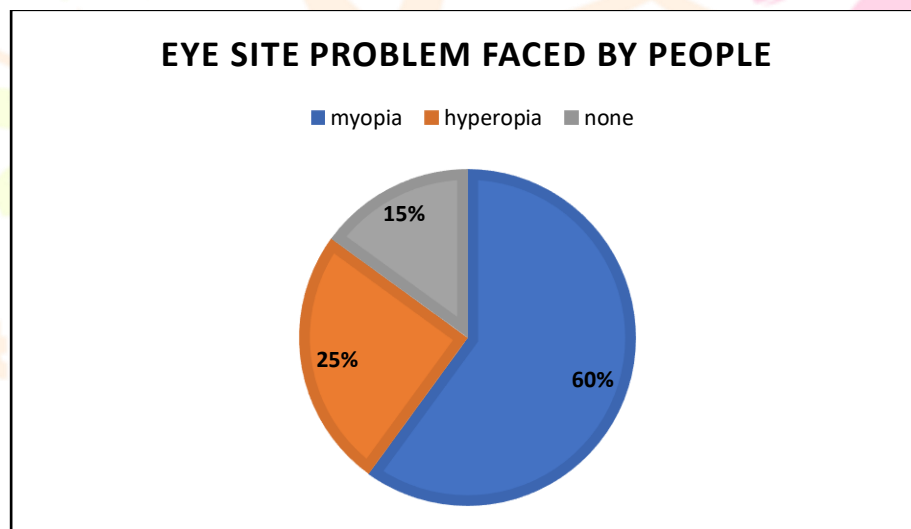


Fig no. 8 – Eye site problem faced by people

- v. In the COVID period people face the problem of eye strain due to longer duration of screen time, which ultimately affects their eyes leads to redness, irritation.

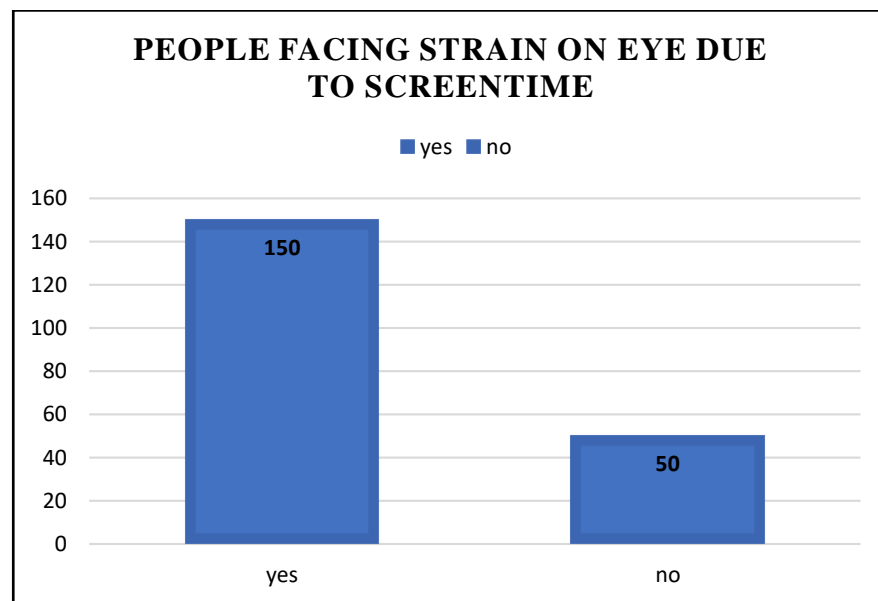


Fig no. 9 – People facing strain on eye due to screentime

- vi. There are no of people who don't know that their eyes get affected by screen time than other reasons like infection or other disease like conjunctivitis.

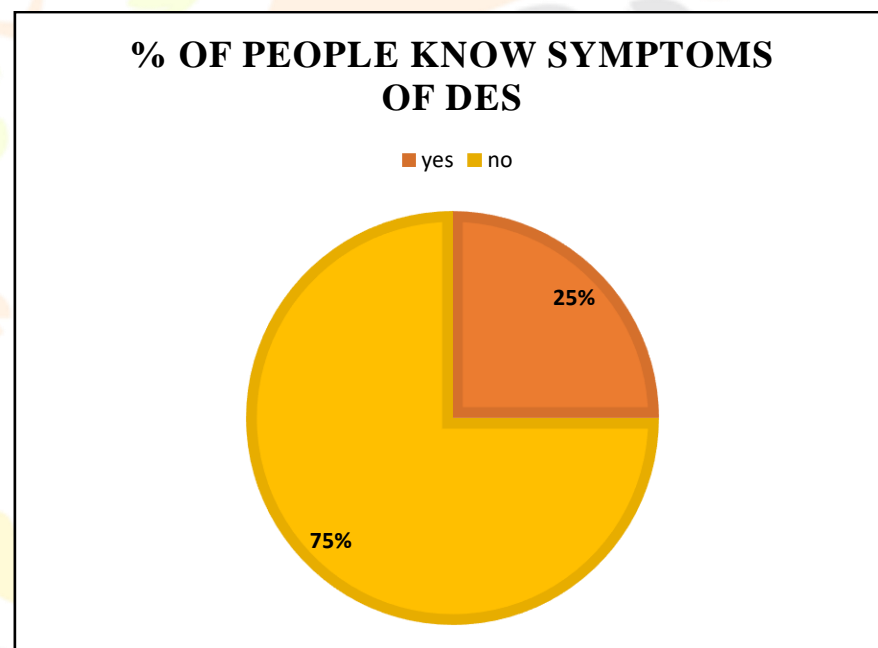


Fig no. 10 – Percentage of people who knows symptoms of DES

- vii. People who face the problems went to physician than self-medication, it is not long duration problem and hence cure in short period of time. Some people go directly to pharmacy for eye drops.

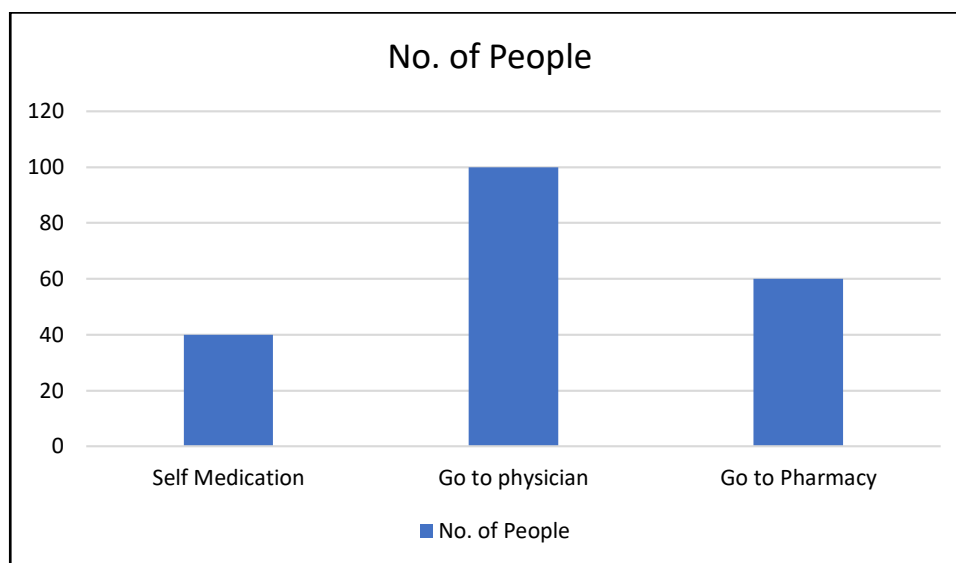


Fig no. 11 – No. of people getting various treatments

- viii. Eye medications mostly physician prescribe that are eye drops and some people gets ayurvedic drops to avoid chemical reaction.

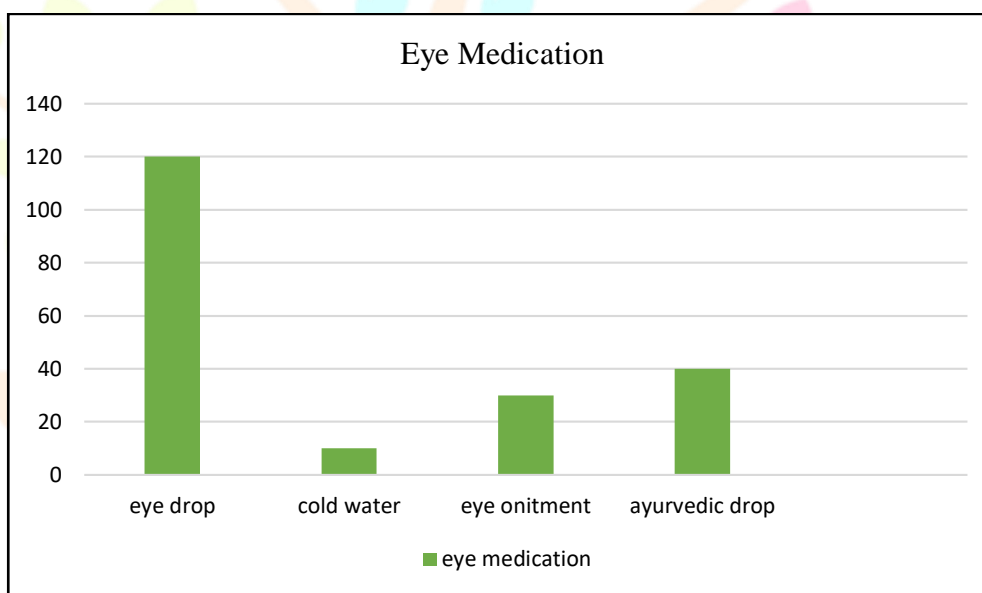


Fig no. 12 – Various Eye Medications

For the irritation of eyes due to screen time most of the physician prescribe CMC eye drop and for watery eyes salt ion drops are prescribed. For infection of eyes antihistamine, anticholinergic eye drop prescribe by physician.

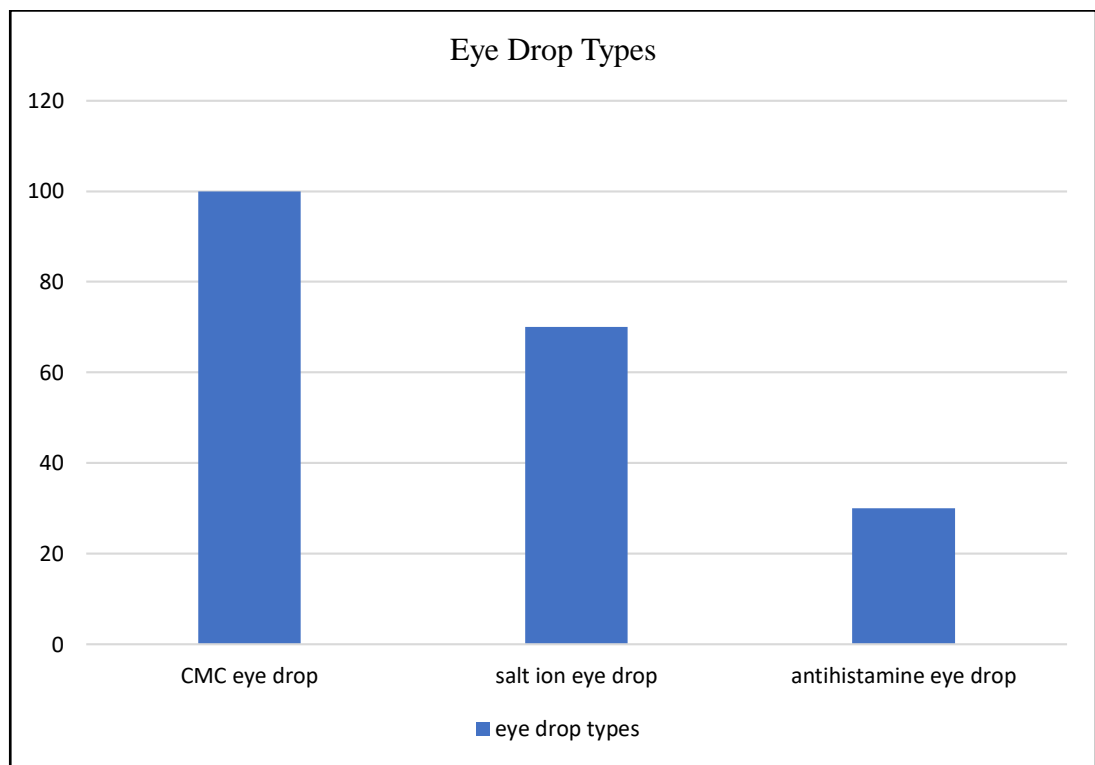


Fig no. 13 – Eye Drop Types prescribed by Ophthalmologist

## Discussion:

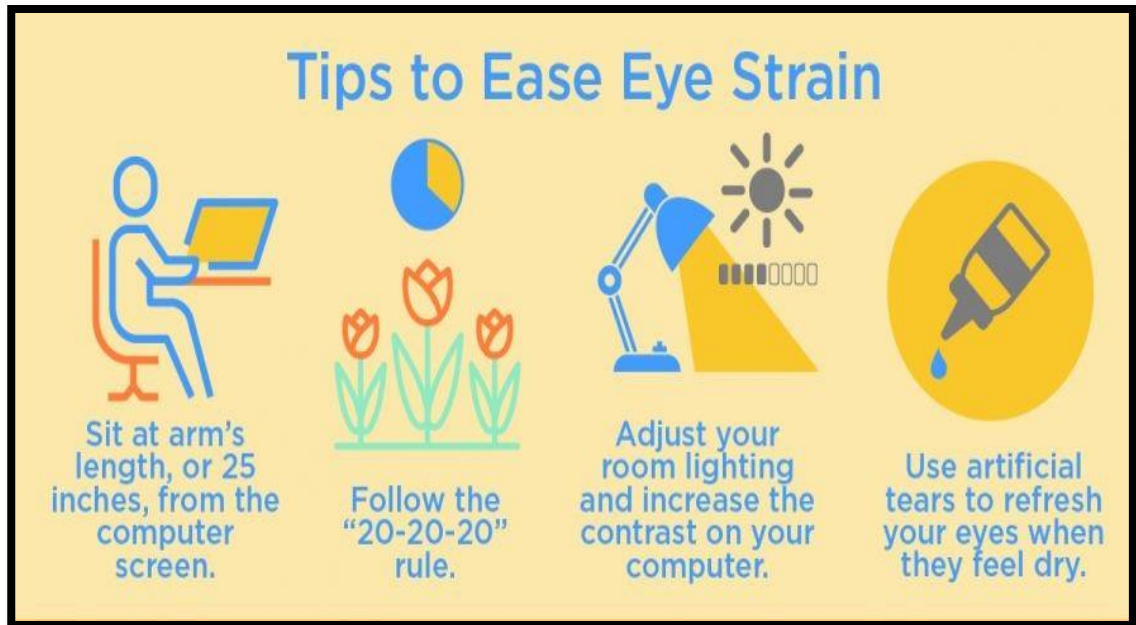
- Digital Eye Strain almost affects 80% of population. It could be described as a syndrome of eye for the people of the modern and urban cities where the screen time is in large amount.
- With above background present study was conducted with the aim of finding out data about causes and prevention of digital eye strain or computer vision syndrome through survey using questionnaire and also to impart knowledge during interaction with volunteers about prevention and management of screen time.
- Objective of the study was to find out to find the screen time by users (children, adults), analysis the effects and prevention of screen time.
- The percentage study found that most of people are not aware about computer vision syndrome but they feel eye strain (fig no. 8) and hence it is main cause for increase eye number.
- Those people who worked from home have majorly face the problem of digital eye strain (fig no. 5) because of their average screen time is 6-8 hours per day.
- Because of increase screen time day by day people face the problem of eye strain and get spectacle (fig no. 6) and those who already have spectacle, their eye number is increasing (fig no. 7).
- People avoid the digital eye strain symptoms and take it lightly afterwards effect is shown on their eyes cause eye irritation and fatigue (fig no. 9 & 10).
- Eye strain afterwards leads to the myopia and hyperopia. Many children complaints that they don't see blackboard from last bench of classroom after reopen of the schools (fig no. 8).

- From the survey found that patient suffering from eye strain due to screen time go to physician/ ophthalmologist for treatment of eye (75%), some get problem of only eye irritation go to pharmacy shop for eye drop. (fig no. 11)
- From survey study it shown that ophthalmologist prescribe eye drops for the eye irritation as well eye infection than ointment (60%). Some people can prefer Ayurvedic eye drops that are made of natural ingredients. (fig no. 12)
- For the irritation of eyes **CMC eye drop** and for watery eyes **salt ion drops**, infection of eyes **antihistamine, anticholinergic eye drop** prescribes by physician. (fig no. 13)

## Summary/ Outcome:

- Computer vision syndrome, also referred to as **digital eye strain**, describes a group of eye- and vision-related problems that result from prolonged computer, tablet, e-reader and cell phone use.
- Many individuals experience eye discomfort and vision problems when viewing digital screens for COVID period and after that.
- The level of discomfort appears to increase with the amount of digital screen use. The extent to which individuals experience by survey, visual symptoms often depends on the level of their visual abilities and the amount of time spent looking at a digital screen.
- Uncorrected vision problems like **farsightedness** and **astigmatism**, inadequate eye focusing or eye coordination abilities, and aging changes of the eyes, such as **presbyopia**, can all contribute to the development of visual symptoms when using a computer or digital screen device.
- CVS, or digital eyestrain, can be diagnosed through a **comprehensive eye examination**. Testing, with special emphasis on visual requirements at the computer or digital device working distance.
- Solutions to digital screen-related vision problems are varied. However, they can usually be alleviated by obtaining regular eye care and making changes in how the screen is viewed. In some cases, individuals who do not require the use of eyeglasses for other daily activities may benefit from glasses prescribed specifically for computer use.
- In addition, persons already wearing glasses may find their current prescription does not provide optimal vision for viewing a computer. Eyeglasses or contact lenses prescribed for general use may not be adequate for computer work. Lenses prescribed to meet the unique visual demands of computer viewing may be needed. Special lens designs, lens powers or lens tints or coatings may help to maximize visual abilities and comfort.
- Proper body positioning for computer use. Some important factors in preventing or reducing the symptoms of CVS have to do with the computer and how it is used. This includes lighting conditions, chair comfort, location of reference materials, the position of the monitor, and the use of rest breaks.

- Regular eye examinations and proper viewing habits can help to prevent or reduce the development of the symptoms associated with CVS. Prevention or reduction of the vision problems associated with CVS or digital eyestrain involves taking steps to control lighting and glare on the device screen, establishing proper working distances and posture for screen viewing and assuring that even minor vision problems are properly corrected.



**Fig No.14 Preventive rules for Digital**

## Conclusion:

The survey study concluded that 80% population suffer from digital eye strain (DES), because of screen time that includes mobile video games, work from home by computer, social media surfing, etc. because of the COVID pandemic indoor activities were increase and people get suffer from eye fatigue as well as other eye problems.

People get spectacle during this period, and spectacle number get increased year to year. Viewing a computer or digital screen often makes the eyes work harder. As a result, the unique characteristics and high visual demands of computer and digital screen viewing make many individuals susceptible to the development of vision-related symptoms. Uncorrected vision problems can increase the severity of computer vision syndrome (CVS) or digital eyestrain symptoms. Viewing a computer or digital screen is different than reading a printed page. Often the letters on the computer or handheld device are not as precise or sharply defined, the level of contrast of the letters to the background is reduced, and the presence of glare and reflections on the screen may make viewing difficult.



Many of the visual symptoms experienced by users are only temporary and will decline after stopping computer work or use of the digital device. However, some individuals may experience continued reduced visual abilities, such as blurred distance vision, even after stopping work at a computer. If nothing is done to address the cause of the problem, the symptoms will continue to recur and perhaps worsen with future digital screen use.

Visual acuity measurements to assess the extent to which vision may be affected. A refraction to determine the appropriate lens power needed to compensate for any refractive errors (nearsightedness, farsightedness or astigmatism).

Solutions to digital screen-related vision problems are varied. However, they can usually be alleviated by obtaining regular eye care and making changes in how the screen is viewed. In some cases, individuals who do not require the use of eyeglasses for other daily activities may benefit from glasses prescribed specifically for computer use. In addition, persons already wearing glasses may find their current prescription does not provide optimal vision for viewing a computer.

Eyeglasses or contact lenses prescribed for general use may not be adequate for computer work. Lenses prescribed to meet the unique visual demands of computer viewing may be needed. Special lens designs, lens powers or lens tints or coatings may help to maximize visual abilities and comfort.

Prevention or reduction of the vision problems associated with CVS or digital eyestrain involves taking steps to control lighting and glare on the device screen, establishing proper working distances and posture for screen viewing and assuring that even minor vision problems are properly corrected.

- **Don't take a vision problem to work**
- **Glasses should meet the demand of the job**
- **Minimize discomfort from blue light and glare**
- **Adjust work area and computer for comfort.**
- **Use an adjustable copyholder**
- **Take alternative task breaks throughout the day.**

## References:

1. Steven Poole: 'Screen Time: How the phrase went from neutral to shameful' 2019. [https://www.theguardian.com/books/2019/feb/01/from-cinema-to-smartphones-how-screen-time-became-a-problem]
  2. Dr. Koushik Tripathy: 'Computer vision syndrome (Digital Eye Strain) Effect of DES'. April 7, 2022 [https://eyewiki.aao.org/Computer\_Vision\_Syndrome\_(Digital\_Eye\_Strain).]
  3. Dr. Apurvakumar Pandya: 'Social connection, excessive Screen time during COVID-19 and Mental Health: A review of current Evidence'. July 22, 2021 [https://www.frontiersin.org/articles/10.3389/fhumd.2021.684137/full]
  4. Dr. Ayesha Malik: 'How too much Screen time affects eyes' Dec 21, 2021 [https://www.chop.edu/news/health-tip/how-too-much-screen-time-affects-eyes]
  5. Dr. Kirandeep Kaur: 'causes of Digital Eye Strain' Oct, 2022 [https://pubmed.ncbi.nlm.nih.gov/35809192/]
  6. Dr. Yazan Gammoh: 'Digital Eye Strain and its Risk Factors among a university', Feb 2021 [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8007199/]
  7. Dr. Jie Zhu: 'Eye Anatomy' 2012 [https://www.researchgate.net/publication/277708055\_Eye\_Anatomy]
  8. Dr. Lama Assi: 'A Global Assessment of Eye Health and Quality of Life' Feb 12, 2021 [https://jamanetwork.com/journals/jamaophthalmology/fullarticle/2776467]
  9. Dr. Sophie J. Bakri: 'Mayo Clinic Guide to Better Vision' The Book for the treatment of the Digital Eye Strain.
- Dr. Odalys Mendoza: 'Home Remedies for simple Eye Problems' Jan 24, 2022 [https://www.aao.org/eye-health/tips-prevention/home-remedies]

10. Dr. Atika Khan: 'Eye drops: Over the counter drops' Jun 18, 2021  
[<https://timesofindia.indiatimes.com/most-searched-products/health-and-fitness/health-care/eye-care-over-the-counter-eye-drops-you-can-buy-for-dry-eyes-and-eye-strain/articleshow/71765463.cms>]
11. Dr. John Douillard: 'The secret Ingredients in Ayurvedic Dry Eye Care' Jan 16, 2021  
[<https://lifespa.com/ayurvedic-lifestyle/ayurvedic-dry-eye-care/>]
12. Dr. Sarah C. P. Williams: 'Prevent eyestrain from Digital Devices' Nov 24, 2021  
[<https://www.webmd.com/eye-health/prevent-digital-eyestrain>]
13. Vision Therapy Exercise: [<https://www.icarevision.com/vision-therapy/eye-exercises-you-can-try-at-home/>]
14. Anatomy of the Eye: [[https://www.ncbi.nlm.nih.gov/books/NBK65754/figure/CDR0000258033\\_\\_141/](https://www.ncbi.nlm.nih.gov/books/NBK65754/figure/CDR0000258033__141/)]
15. 20-20-20- Rule for Eye: [<https://murataeyecare.com/eye-health/20-20-20-rule/>]
16. Prevention by Setting Rule for Children: [<https://www.unicef.org/india/parentingtips/ten-tips-cutting-down-screen-time-during-covid-19>]

