

Prevalence Of Computer Vision Syndrome In Our Health

Sayan Sardar¹, Anusuya Das²

¹Student, Department of optometry Swami Vivekananda University, Barrackpore, WB 700121

²Assistant Professor, Department of Optometry, Swami Vivekananda University, Barrackpore, WB 700121

Abstract:

This review paper critically examines the contemporary body of research on digital eye strain (DES) arising from prolonged engagement with electronic devices, such as television screens, mobile phones, and laptops. Several ocular and visual symptoms resulting from use of digital devices are collectively known as digital eye strain (DES) or computer vision syndrome (CVS). Few studies exist on the prevalence of DES among young adults in the Eastern Mediterranean region. Drawing upon a diverse array of scientific studies, encompassing clinical trials and experimental inquiries, this review synthesizes current knowledge regarding the impact of extended screen exposure on critical visual parameters. Key topics explored include the impact of extended screen time on visual acuity, accommodation, and the development of symptoms such as eye fatigue, dryness, and discomfort. Additionally, attention is directed towards exploring the modulating influence of environmental factors, such as ambient lighting conditions and display characteristics, on the severity and manifestation of digital eye strain. We explore the mechanisms by which prolonged screen time impacts the eyes, focusing on factors such as reduced blink rate, increased accommodative stress, and blue light exposure. The review further analyses the spectrum of symptoms associated with DES, including dry eye, blurred vision, eye fatigue, and headaches.

This study aimed to investigate & determine the prevalence & severity of Computer vision syndrome (CVS) and Digital eye strain along with symptoms, knowledge and practice of computer, mobile using with appropriate scientific manner.

Keywords: Digital device (DD), Computer vision syndrome (CVS), Digital eye strain, Dry eye syndrome (DES), Blue lights.

Backgrounds: After the pandemic of Covid-19, every individual including students, teachers, businessman, engineers, researchers are depending in Internet through their laptops, computers, mobile etc. They continue their professionals works including meeting, homework done by their electronic gadgets. So, they spent most of the time Infront of digital screen. As a result, they are suffering Headache, Eye strain, Dry eye, Blurred vision, Neck pain, Backpain, Shoulder pain, Watery eye, red eye, Discomfort, Double vision (Diplopia) etc. (1) (2)

Introduction

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. (3)

In the age of digital dominance, our reliance on electronic devices has grown exponentially, shaping the way we work, learn, and connect with the world. Advanced technology has made an impact on every individual's life (Medical facilities, engineers, designers, VFX, Office work, etc). A personal mobile phone is common nowadays in every college & University student and office worker for increased efficiency in easy access to reading, writing, access informative data, communication with others, etc. The seamless integration of mobile phones, laptops, tablets, and other electronic gadgets into our daily lives has ushered in unparalleled convenience, yet it has also given rise to a pervasive concern—Digital Eye Strain (DES). Digital Eye Strain, often interchangeably referred to as “computer vision syndrome” or “screen fatigue,” encompasses a spectrum of ocular symptoms resulting from extended use of digital devices. The symptoms of Digital Eye Strain are diverse and can manifest in various forms,

contributing to a sense of discomfort and visual impairment. Common complaints include eye fatigue, dryness, blurred vision, headaches, and even disruptions in sleep patterns. The amalgamation of these symptoms poses challenges not only to ocular health but also to overall quality of life. Electronic devices, particularly those equipped with light-emitting diode (LED) displays, emit significant amounts of blue light. The concentrated exposure to blue light during screen time has raised questions about its potential effects on the eyes. Unlike natural sunlight, which contains a balanced spectrum of visible light, screens emit a higher proportion of blue light, contributing to concerns about its impact on ocular health. Scientific inquiry has delved into the potential for blue light-induced phototoxicity, raising questions about its impact on retinal cells. Laboratory studies have suggested that exposure to blue light can generate reactive oxygen species (ROS) and trigger apoptotic processes in retinal cells. (4) (5) (6)

Blue light has a short wavelength of approximately 380 nm - 500 nm, which is found in the visual spectrum. Also, this blue light is emitted from all electronic digital devices like mobile, laptops, tablets, LED lights, and televisions. The study shows that the effects of blue light with a particular focus on using digital devices with LED displays show the safety hazards of blue light in our human eye. Our human eye does not have any adequate protection against blue light exposure. In our human cornea absorbs wavelengths <300 nm, the crystalline lens absorbs 300 nm - 400 nm & the retina primarily absorbs 390nm - 760 nm. (6)

Students of this generation have gradually transferred to internet-based video learning because this is most effective for pre-schooling children. After the epidemic of COVID-19, the whole scenario of the usage of digital gadgets has changed, in the practice of social distancing, they are addicted to social media, attending class, e-book reading, etc. For this, they spent 7 hours a day spent Infront of digital gadgets & finally affected by CVS. (7)

In addition, an investigation of over 2000 American children between 8 and 18 years of age found that, on an average day, they spend approximately 7.5 hours viewing entertainment

media (comprising the individual spends over 4.5 hours watching television, approximately 1.5 hours using the computer, and over an hour engaging in computer games.) (8)

Another investigation shows, that after wake up a individual at morning, 35% reach for their phones, for coffee 17%, for toothbrush 13% or for other works 10% (8)

Discussion:

In modern times we are mostly dependent on our work along with communication & study depending upon the digital devices (DD) like mobile, desktop, laptop, tablet, etc. Now this time, we can't imagine a day without the internet. Approximately reading of fifty papers, which are written in the year between 2010 to 2023. In this year's revolution of social media to a smartphone can insist on using the DD every second. Also, in the time of COVID-19, where every individual is in a 'Lockdown', this time using of internet is only earning points. The aftermath of the COVID-19 pandemic has witnessed an unprecedented surge in remote work, online education, and increased screen time for various daily activities. This shift has significantly heightened the prevalence of Digital Eye Strain (DES). The lifestyle changes necessitated by the pandemic, including prolonged screen usage for work, socializing, and entertainment, have substantially contributed to the exacerbation of DES. Remote work has blurred the lines between professional and personal screen usage, contributing to prolonged periods of digital device engagement. Understanding the epidemiological landscape of DES post-COVID-19 is essential for devising targeted interventions.

A detailed examination of the symptoms associated with DES and CVS post-COVID-19 is imperative. The spectrum of ocular discomfort, including eye fatigue, dryness, blurred vision, headaches, and neck pain, necessitates a thorough understanding of their prevalence and interplay.

As a report over 60 million people worldwide suffer the CVS & annually approximately 1 million new cases are register, but this CVS can easily preventable. (9)

A survey shows that In Europe, 30% of workers use their computers all the time when they are working, also 25% of workers spend between one-fourth to three-fourths of time in front of the computer screen. (10)

An investigation of over 2000 American children between 8 and 18 years of age found that, on an average day, they spend approximately 7.5 hours viewing entertainment media (comprising 4.5 hours watching television, 1.5 hours on a computer, and over an hour playing computer games). (11)

The method of CVS-Q shows that more than six scores indicate, that the respondent suffers from CVS. So, calculate this strategy 94.5% of the students of this university (Jordon) suffer various symptoms of CVS. (1)

The students of the Eastern Mediterranean region also indicated that the students of medical & health sciences have CVS syndrome in the population of 97.3% of students in Saudi Arabia. (11)

Approximately 86% of medical students complain of at least one symptom related to CVS In Egypt. (12)

The medical students of Nepal reported that 71.6% related to CVS. Also, in INDIA about 80.3% of students of engineering & medicine reported CVS suffers. (13)

In the other report, asthenopic patient can found in Indian is 46.3%, 32.9% in Italy, 68.5% in Mexico & 63.4% in Australia. (14) (15) (16)

One of the most developing causes of CVS is that most students use digital screens for their study which is more than six hours. (17) (18) (19)

Approximately 50% of students report that the use of digital devices can affect their lifestyle & health. Also, 33% of students report pain in their neck, shoulder, joints of arm & wrist. Most of the students also report that they face difficulty writing with pens after the use of excessive time on digital devices. The most common symptoms in computer users are pain in the neck & shoulders. (20)

Also, the pains of Upper musculoskeletal are experienced by digital device users. (21)

In another study of 634 individuals, where 371 individuals (58.51%) were using digital screens 8 hours a day. Also, the majority (72.39%) of patients are suffering acute symptoms & 27.60% are suffering chronic symptoms in CVS. This study also shows the majority (62.4%) were suffering from eye strain & another hand 7.57% of individuals suffered from the second common cause which is a burning sensation in the eyes, as dryness, redness, irritation, watering, and neck stiffness are found in the remaining part of the individual in this survey. (22)

In a survey about 795 students, who were aged between 18 to 25, from different five universities in Malaysia. In these Students who are using their digital devices for more than 2 hours, the symptoms of CVS (one or more) were found to be 89.9%, the most common disturbing symptom was headache (19.7) associated with eye strain (16.4%). (23)

In another study of 775 students from Business College & College of Medicine, where majority of students reported headaches which were most common about 42.1%, secondly most common symptoms were dry eyes that is 5.6%, also neck & shoulder pain both are found in 11.8% students, minimum amount of eye redness symptoms found that is 1.4%. Here all of the symptoms are associated with excessive working with digital screens and the symptoms are CVS. (24)

One of the latest reports by 'The Washington Post' based on a survey between 10000 Americans shows the effects of digital eye strain in their daily life by using digital devices (DD) excessively. The reports behalf of age showing (25) ---

- The age between 20 – and 30 reported that 73% of individuals showed symptoms of digital eye strain, also in this group, 87% use two or more digital devices in a single day simultaneously.
- The age group of 30 – 40 reported that 69% of individuals showed symptoms of digital eye strain, also, these groups spent more than five hours in front of digital screens in a single day.

- The age group of 40 – 50 reported that 66% of individuals have digital eye strain in their daily life.
- The age group of 50 – 60 reported that 53% of individuals reported digital eye strain.

At the age of 30 or an adult, youngsters are most vulnerable to digital eye strain. (25)

Another study was conducted to build a relationship between CVS (without contact lens users) & CVS (with contact lens users). After the analysis report, we can show the prevalence of contact lens users having CVS is 65% & non-contact lens users have 50% symptoms of CVS. Also, the use of contact lens more than 6 hours by workers has more symptoms of CVS than non-contact lens users. (26)

The symptoms of computer vision syndrome (CVS): (27) (28)

- Accommodation-related symptoms – Double vision (Diplopia), Blurred vision, Fatigue of the eye.
- The symptoms experienced in computer vision syndrome (CVS) are caused by three potential mechanisms:
 - (I) Extraocular mechanism, (ii) accommodative mechanism, and (iii) ocular surface mechanism. (29)
- Systemic symptoms – Neck pain, Headache, Backache, Neck stiffness, Shoulder pain.
- External ocular symptoms – Burning, Redness, Watering, Dryness, Irritation.
- Internal ocular symptoms – Eye ache, Frontal headache, Eye strain.
- Binocular vision related – Convergence insufficiency, Decompensated heterophoria, Poor vergence facility.

Blue lights that are emitted from the digital screen have a crucial role in our sleeping circle. Melatonin hormone which is responsible for our sleeping is suppressed by overuse of DD. Our

digital devices (DD) use LED displays that have low-wavelength blue light, which is responsible for suppressing the rising of melatonin in the evening. (30) (31)

A survey between 2417 clerks in Japan showed that after 6 hours of using DD, they suffered from Insomnia. (32)

A study in Europe & England showed that at the 3 years age of pre-school going children spent 2 hours with DD which is 68% of individuals, also, 54% of individuals have actively used online platforms. (33)

Management of CVS:

According to the American Optometric Association (AOA), the usage of digital devices continuously for more than two hours is adequate to bring about digital eye strain and CVS found in users. (34)

Many factors such as posture, use of screen filter, room illumination, screen brightness, and distance from screen can contribute to development of severity of CVS. (35)

- **Blinking:** Frequently blinking can moisture our palpebral aperture & reduce dryness.

- **Follow the rule 20-20-20:** The most prescribed & most effective procedure for relief from DES. This method uses DD every 20 minutes takes a break for 20 sec & looks something away for at least 20 feet. These regular practices can reduce DES. (American Optometric Association)

- **Adjust screen settings:** Adjust screen colour temperature, brightness, contrast, and text size when using DD.

- **Enough room light:** When using DD maintain the room light at sufficient medium. It can reduce eye strain & minimize glare.

- **Artificial tear:** If a patient has dry eye syndrome, use artificial tears frequently as a direction of the Optometrist & Ophthalmologist.

- **Computer & Laptop screen setup:** Scientifically, when the eye can see downward it is more comfortable. So, the computer screen should be 15 to 20 degrees below eye level and from the eye 20 – 28 inches.

- Seating position: Chairs should be height adjustable according to the user's height along with leg space with a leg pad.
- Antiglare screen: Use an anti-glare screen in DD to reduce eye strain.
- Routine eye examination: Regular eye examination is essential for every digital device user, it can reveal tear level, any refractive error, dry eye syndrome, etc.
- Hydration: Take a break and get a glass of for Hydration. Hydration is very important for our health along with our eyes.
- Blue-cut lenses: The other most prescribed subjects are blue-cut lenses by The Optometrist & Ophthalmologist. Which blocks the blue lights that are emitted from digital devices. But if you are turning on the settings of 'Night mode' in any DD it can same effects as the blue-cut lens.

Conclusion:

Digital eye strain has been on the rise since the beginning of the COVID-19 pandemic. In conclusion, the pervasive and prolonged use of digital devices has given rise to a significant health concern known as Digital Eye Syndrome (DES). This review paper has delved into the multifaceted aspects of DES, examining its prevalence, symptoms, and potential mitigating strategies. The evidence presented underscores the widespread impact of excessive screen time on ocular health, manifesting in symptoms such as eye strain, dryness, blurred vision, and headaches. At that time use of digital devices for work, education along communication is very important for individuals of all ages. In this paper, we highlighted various factors contributing to Dry eye syndrome including excessive screen use, reduced blink rate, watering from the eye, etc.

Computer vision syndrome (CVS), which is formally known as digital eye strain, is associated with eye and vision problems from the use of computers and other electronic devices which are emit low-wavelength blue lights. A manifested growth pattern has been experienced the CVS is present 5% - 65% in pre-COVID-19 studies & after COVID-19 it can present

at 80% - 94% individuals. In that time sudden increase in the use of DD has leading eye- strain, diabetes, obesity, myopia, musculoskeletal problems, etc.

In the year 2024, we can't control our use of DD, because after COVID-19 we are addicted to these such a digital device. In the time of lockdown, the youngster is addicted to video games

such as PUBG, Free-fire, FIFA, etc, along with social media platforms such as Facebook, Instagram, YouTube, Tik-Tok, etc. The students also use E-Books for their study, because the all resources are available on the Internet along with the library.

So, for our good lifestyle & good vision, we need some action to reduce the increase of CVS. Like using blue-cut lenses, turning on night mode on all digital devices using proper sitting arrangements at chairs and tables for proper body language when using DD, using the library with a hard copy of a book, and maintaining 20-20-20 rule.

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