Original Research Article

Health promotion an eye opener tool for computer vision syndrome

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ABSTRACT

Background: Computer is one of the most common office tools used in a variety of institutions worldwide. Using a computer for an extended period of time put users at a higher risk of developing computer vision syndrome. The leading occupational health problem of the 21st century is computer vision syndrome

Methods: This is an online-based, cross-sectional study that was conducted between June 3rd and June 14th, 2021. We selected approximately 200 computer users, both students and working, ranging in age from 10 to 40 years, who spend a significant amount of time in front of a digital screen. Data was gathered by completing an online questionnaire form about C.V.S.

Results: A Google form was filled out by 200 people, both students and working professionals, and it was discovered that more than 90% of the population are aware of the negative effects of excessive screen time. Only having knowledge and being aware is insufficient to reduce CVS incidences and prevalence. Approaches to health promotion are critical in understanding the reasons for the increased prevalence of CVS. Only 41% wear protective eyewear, demonstrating negligence and the importance of a behavioural change approach in reducing CVS prevalence.

Conclusions: We can conclude that excessive screen use can cause problems. People may be aware of the negative effects of screens, but they continue to ignore their eye health. Educating yourself on the ideal eye screen distance of 51 cm (20 inches) is essential, as is the use of protective eyewear.

Keywords: Health promotion, Awareness, Computer vision syndrome, Knowledge screentime

INTRODUCTION

Computer vision syndrome (CVS), is defined by the American optometric association as a complex of eye and vision problems related to the activities which stress the near vision and which are experienced in relation to or during the use of computers.[1] It is made up of a group of visual symptoms that appear as a result of them viewing of the video display terminal for a longer period of time (VDT), when the task's demands surpass the person's ability viewer. CVS symptoms include dry, itchy eyes, eye fatigue/strain, impaired vision, red and burning eyes, excessive tears, double vision, headache, light/dark

sensitivity, sensitivity to glare, difficulty in shifting focus, and shifts in focus in the perception of colour.[2] The increased usage of computers in the workplace over the last few decades has resulted in the emergence of a number of health issues. Many people who work at a computer or a video display terminal have a lot of complaints and symptoms related to their jobs. CVS is termed by the American optometric association (AOA).[3]

Functional anatomy of eye

There are various complex organs in the human body and eye is one of them which is protected from external

trauma by eyelids. Eye lids and their closing protect the eyes from injury and excessive light. Tears are distributed along the anterior surface of the eye ball with the help of the eye lids. The anterior surface of the cornea, which is coated by a thin tear film, is the primary optical element of the eye. The purpose of the eye lids is to keep the corneal surface and its thin layer of tear intact by blinking. The health of the corneal surface will immediately deteriorate if this blinking activity is lost. Blinking that occurs on a regular basis without an apparent external trigger is known as spontaneous blinking. The rate of spontaneous blinking in an adult human is 15 per minute, with each blink lasting 300-400 milliseconds.

The activity of the blinking centers in the brain determines the typical blinking rate, which is adjusted by external inputs. Pre-corneal film refers to the tear film that forms on the surface of the cornea and is made up of three layers. It has a thickness of 7-10 micrometres.[2] Convergence, accommodation, and pupillary constriction all happen at the same time when a near object is focused (miosis) When an object is closer than infinity, the system's dioptric power must be increased in order to concentrate the object's image on the retina clearly. The difference in refracting power of the eye in the two stages of total relaxation and maximal accommodation is known as amplitude of accommodation. Most close work is done at a distance of 25-40cm in normal circumstances. If the non-accommodating eye is emmetropic (i.e. the retina is conjugate with infinity or any amertropia is corrected with spectacles or contact lenses), 2.5 to 4 diopters of accommodation are needed to see objects clearly at this distance.

The computer

The term monitor normally refers to the entire box, whereas the phrase display screen refers to only the screen. Furthermore, the term monitor is frequently used to refer to graphics capabilities. Monitors can be classified in a variety of ways. Color monitors may show between 16 and 1 million different colours.

The monitor's screen size, which is measured in diagonal inches, is an important feature. Band width, refresh rates, interlaced or non-interlaced, dot pitch, and convergence are other elements that influence monitor quality. The number of dots (pixels) on the entire screen is referred to as screen resolution. Pictures are displayed on graphics displays by dividing the display screen into hundreds (or millions) of pixels that are organised in rows and columns. The pixels appear to be connected because they are so close together. A display system's quality is mostly determined by its resolution, the number of pixels it can display, and the number of bits required to represent each pixel. True Color displays have 24 bits per pixel, enabling for over 16 million different colors to be displayed.

Computer vision syndrome

Sion syndrome: the complex of the eye and vision problem related to near work which are experience during or related to computer use. CVS is characterized by visual symptoms which result from interaction. The AOA defines CVS as the complex of the eye and vision problem related to which can be experienced during or related to computer use. 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. While looking at digital screens for long period of time, many people develop eye irritation and eyesight issues. The amount of time spent in front of a digital screen appears to enhance the level of discomfort. When you're looking at a computer or a digital screen, your eyes have to work harder. As a result, many people are susceptible to vision-related illnesses due to the specific characteristics and high visual demands of computer and digital screen gazing. Computer vision syndrome or digital eyestrain symptoms can be made worse by uncorrected vision impairments. Reading a printed page is not the same as looking at a computer or digital screen. The letters on a computer or mobile device are frequently not as exact or precisely defined, the contrast between the letters and the backdrop is diminished, and glare and reflections on the screen can make viewing difficult. Follow the 20-20-20 rule to reduce digital eyestrain: every 20 minutes, take a 20-second break to look at something 20 feet away. Though we are aware about everything still we aren't able to overcome the CVS and best way to overcome can be health promotion.

What is health promotion and how can it be one of the most important tools to decreases CVS?

According to WHO health is defined as health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.[4] According to Ottawa charter Health promotion is the process of enabling people to increase control over, and to improve, their health. It moves beyond a focus on individual behaviour towards a wide range of social and environmental interventions.[5,6] Health promotion is more important than ever in addressing public health issues. The global health scenario is at a crossroads, with the world facing a 'triple burden of diseases' comprised of an unfinished agenda of communicable diseases, newly emerging and re-emerging diseases, and an unprecedented rise in non-communicable chronic diseases. Factors that aid progress and development in today's world, such as globalization of trade, urbanization, ease of global travel, advanced technologies, and so on, act as a double-edged sword in that they lead to positive health outcomes on the one hand while increasing vulnerability to poor health on the other by contributing to sedentary lifestyles and unhealthy dietary patterns.[6] Various approaches of health promotion

like medical approach, educational approach, behavioral change approach, empowerment approach and social change approach can be key element to educate aware and prevent the CVS amongst students and working individuals, so aim of the study is to assess the knowledge of students and working professional regarding computer vision syndrome and to assess the relationship between knowledge and health promotion approaches and to raise the concern of students and working professionals about the severity of eye symptoms after prolonged computer use and increased screen time.

METHODS

Inclusion and exclusion criteria

Inclusion criteria for current study were students and working professional who spend the considerable amount of time on screen and blind people were excluded from the study.

Procedure

This is online based, cross-sectional study, which was conducted in between 3 June 2021 to 14 June 2021, we selected around 200 computer users both students and working aged from 10-40 years who spend considerable amount of time in front of the digital screen. Data was collected by filling the online questionnaire form related to CVS. Sampling method followed in current study was snow ball sampling technique.

RESULTS

Knowledge regarding CVS

A total of 200 people, both students and working professionals, filled out a Google form. Respondents ranged in age from 10 to 40. Out of 200 responses, 57 percent are male and 44 percent are female, indicating that men outnumber women (Figure 1).
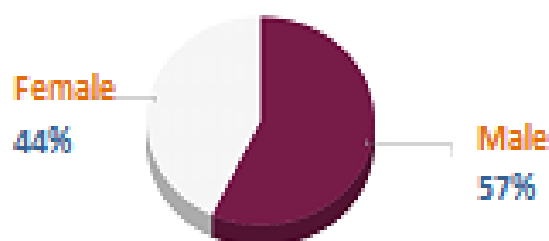

Figure 1: Percentage of respondent.

Out of 200 responses, 44% are working people, while 56% are students. 72% of respondents go to the doctor, while 12.5% do not. Only 77 respondents, or 38.5 percent, have no symptoms, while the remaining 123 respondents, or 61.5 percent, have a variety of symptoms

(Figure 2). Despite the fact that 61.5 percent of respondents have symptoms, only 29.5 percent use medication to treat them. The majority of respondents spend their 5-8 hours on screen.
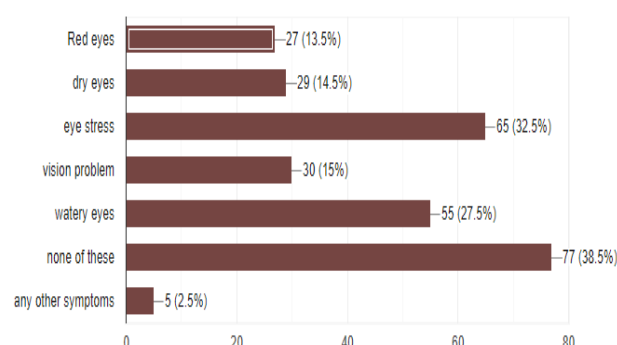

Figure 2: Percentage of symptoms.

There were nearly 70 people. Some people work for more than 16 hours a day (Figure 3). 150respondents are holding their screens too close to their eyes, which is incorrect (Figure 4). Total 49 percent of respondents do not wear any type of protective eyewear. It is used by 12% of the population occasionaly, and by 39% of the population on a regular basis. 75% of respondents have had their eyes checked, while 25% have never seen a doctor. 68.5 percent of respondents say they would like to spend less time on their screens. While 12% say no. 90% of respondents said they are aware of the negative effects of increased screen time (Figure 5).
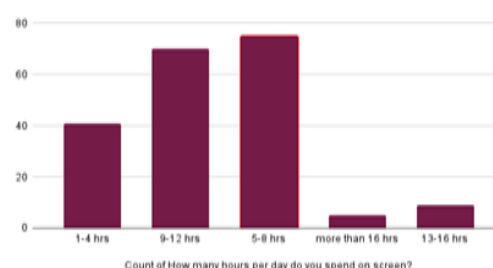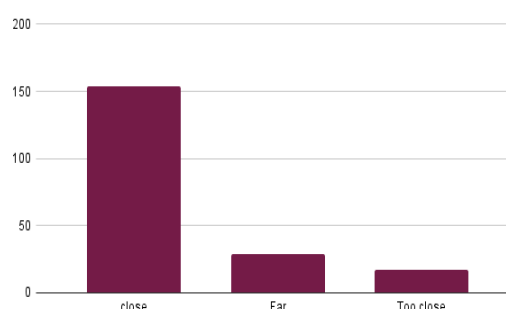

Figure 3: Time spend on screen.

Figure 4: Distance of screen from eyes.

Knowledge affecting health promotion approaches

As previously stated, 90 percent of the population is aware of the negative effects of excessive screen time. The prevalence of CVS remains around 85.02 percent.[7] Only having knowledge and being aware is insufficient to reduce CVS incidences and prevalence. Approaches to health promotion are critical in understanding the reasons for the increased prevalence of CVS.

Both working professionals and students are aware of the negative effects of screen time, (Table 1) but only 29% use medication when they experience CVS symptoms, (Table 2) when they have various symptoms (Table 3). This demonstrates a disregard for the medical approach to health promotion. 90% percent of respondents are aware of harmful effects of longer screen and 60 percent are aware of the ideal distance between their eyes and the screen (Table 2). Despite this, only 41% of people (Table 2) wear protective eyewear. This demonstrates negligence and the importance of a behavioral change approach in lowering CVS prevalence.
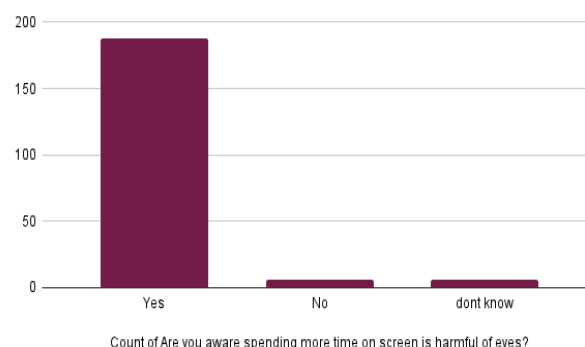

Count of Are you aware spending more time on screen is harmful of eyes?

Figure 5: Knowledge about negative effects of increased screen time.

Table 1: Prevalence of knowledge about longer screen time.

Are you aware spending more time on screen is harmful of eyes?	Aware (n=188)	Not aware (n=6)	No idea (n=6)	Total (n=200)	P value
Age (years)					
Count	184	6	6	196	
Median	24	23.5	17	24	0.007
(Q1, Q3)	20.000, 26.000	19.000, 29.500	17.000, 17.750	19.750, 26.000	
Gender N (%)					
Female	83 (44)	2 (33)	1 (17)	86 (43)	0.363
Male	105 (56)	4 (67)	5 (83)	114 (57)	
Occupation N (%)					
Student	104 (55)	3 (50)	5 (83)	112 (56)	0.379
Working	84 (45)	3 (50)	1 (17)	88 (44)	

DISCUSSION

Study among medical and engineering students in Chennai has found a higher prevalence of CVS (80.3 %).[1] The higher prevalence observed in the Chennai study (80.3 percent) may be due to the study team's inclusion of neck and shoulder pain as a symptom of CVS, whereas our definition of CVS included only eye/visual symptoms other than headache. Also, in our study, only symptoms that lasted at least one week were considered to be CVS symptoms, whereas they had no restriction on the duration of symptoms and thus included even transient symptoms. In the current cross-sectional study, the most common symptom reported was eye stress (32.5 percent), followed by watery eyes (27.5 percent) and vision problems (15 percent). According to our findings, the most common visual symptoms among VDT users are eye strain and vision problems. Despite the fact that respondents experienced these symptoms, only 29.5 percent of them took medication to treat them. One contradictory finding is that the number of respondents going to doctors is higher, at 72 percent.

Health promotion approaches

We can say that CVS's medical approach is good. Medical approach in health promotion is an important tool. The medical approach seeks to free people from medically defined disease and disability.[8] So, going to the doctor and having proper medication can round out the CVS medical approach. The goal of the education approach is to provide people with information, ensure their knowledge and understanding of health issues, and enable them to make informed decisions. People are given health information and are assisted in exploring their values and attitudes as well as making their own decisions. Assistance may also be provided in carrying out those decisions and implementing new health practises. Not only educational approach is responsible we need behavioral change approach is actual implement the educational approach. The behavioral change approach is based upon changing people's individual attitudes and behaviors so that they adopt a healthy lifestyle.[8] A healthy lifestyle is in the best interests of individuals, according to this viewpoint, and health professionals who advocate for this viewpoint will see it as their responsibility to encourage as many people as

possible to adopt the healthy lifestyle they advocate. The majority of respondents spend 5-8 hours per day in front of a screen. There were nearly 70 people. Some people spend more than 16 hours. Furthermore, 49 percent of respondents do not wear any type of protective eyewear.

It is used by 12% of the population on occasion and by 39% of the population on a regular basis. As a result, we must focus on a behavioral change strategy. Not all the individuals use screen for long time as their choices sometime they don't have choice.

Table 2: KAP about computer vision syndrome.

Are you aware spending more time on screen is harmful of eyes?	Aware (n=188)	Not Aware (n=6)	No Idea (n=6)	Total (n=200)	P value
Do you visit doctor when you have ophthalmic (eye) problem?					
Maybe	28 (15)	1 (17)	2 (33)	31 (16)	
No	23 (12)	1 (17)	1 (17)	25 (12)	0.753
Yes	137 (73)	4 (67)	3 (50)	144 (72)	
Do you use any kind of medication/ointment/drops if u have any symptoms?					
Maybe	22 (12)	0 (0)	0 (0)	22 (11)	
No	111 (59)	4 (67)	4 (67)	119 (60)	0.813
Yes	55 (29)	2 (33)	2 (33)	59 (30)	
How many hours per day do you spend on screen?					
1-4	40 (21)	1 (17)	0 (0)	41 (20)	
5-8	68 (36)	4 (67)	3 (50)	75 (38)	
9-12	67 (36)	0 (0)	3 (50)	70 (35)	0.192
13-16	9 (5)	0 (0)	0 (0)	9 (4)	
More than 16	4 (2)	1 (17)	0 (0)	5 (2)	
How close is your screen from your eyes?					
Close	144 (77)	4 (67)	6 (100)	154 (77)	
Far	28 (15)	1 (17)	0 (0)	29 (14)	0.664
Too close	16 (9)	1 (17)	0 (0)	17 (8)	
Are you aware of the ideal distance from eyes to screen					
Maybe	18 (10)	0 (0)	1 (17)	19 (10)	
No	57 (30)	4 (67)	3 (50)	64 (32)	0.257
Yes	113 (60)	2 (33)	2 (33)	117 (58)	
Do you use any protective eye wear/ lenses while working on computer screen?					
No	89 (47)	4 (67)	5 (83)	98 (49)	
sometimes	22 (12)	1 (17)	1 (17)	24 (12)	0.244
Yes	77 (41)	1 (17)	0 (0)	78 (39)	
Have you ever checked your eyes in free eye checking camps or in private hospitals?					
No	73 (39)	2 (33)	3 (50)	78 (39)	0.823
Yes	115 (61)	4 (67)	3 (50)	122 (61)	
Do you feel your working/studying hours onscreen should be reduced by company/schools/colleges etc?					
Maybe	33 (18)	4 (67)	2 (33)	39 (20)	
No	23 (12)	1 (17)	0 (0)	24 (12)	0.026
Yes	132 (70)	1 (17)	4 (67)	137 (68)	

Table 3: Knowledge about CVS and symptoms.

Are you aware spending more time on screen is harmful of eyes?	Aware (n=188)	Not Aware (n=6)	No Idea (n=6)	Total (n=200)	P value
Symptoms					
Any other symptoms					
No	186 (99)	6 (100)	6 (100)	198 (99)	0.938
Yes	2 (1)	0 (0)	0 (0)	2 (1)	
None of these					
No	121 (64)	3 (50)	2 (33)	126 (63)	0.241
Yes	67 (36)	3 (50)	4 (67)	74 (37)	
Watery eyes					
No	134 (71)	6 (100)	5 (83)	145 (72)	0.250

Continued.

Are you aware spending more time on screen is harmful of eyes?	Aware (n=188)	Not Aware (n=6)	No Idea (n=6)	Total (n=200)	P value
Yes	54 (29)	0 (0)	1 (17)	55 (28)	
Red eyes					
No	162 (86)	6 (100)	5 (83)	173 (86)	0.605
Yes	26 (14)	0 (0)	1 (17)	27 (14)	
Dry eyes					
No	161 (86)	4 (67)	6 (100)	171 (86)	0.254
Yes	27 (14)	2 (33)	0 (0)	29 (14)	
Eye stress					
No	124 (66)	5 (83)	6 (100)	135 (68)	0.151
Yes	64 (34)	1 (17)	0 (0)	65 (32)	
Vision problem					
No	158 (84)	6 (100)	6 (100)	170 (85)	0.324
Yes	30 (16)	0 (0)	0 (0)	30 (15)	

Rather than modifying individual behavior, the societal change approach modifies the physical and social environment to make it more conducive to good health. Those who take this approach will value their democratic right to change society, and they will be committed to putting health on political agenda at all levels, as well as to importance of shaping the health environment rather than the individual lives of those who live in it. 68.5% respondents say yes, they want to have less screen time. While 12% says they are okay with their screen time. School colleges and offices should have limited and appropriate screen time or their students and employees.

Limitations

The main limitations of this study were that it was a cross-sectional study, there were no ophthalmic examinations, and the symptoms reported were self-reported. There are several limitations to our study. The cross-sectional design limits the ability to infer causality and can only show a link between CVS and known risk factors.

As a result, prospective follow-up studies among non-CVS computer office workers are needed to identify risk factors for CVS during subsequent follow-up. Another limitation was that CVS symptoms such as neck and shoulder pain were not included. Many studies and reviews on CVS have included it as an extra-ocular symptom. Because the study did not involve an examination of their practices while they were working on their computers, self-reported measurements such as viewing distance and working time may be less accurate.

CONCLUSION

On the basis of health promotion approaches. People are aware of the importance of visiting a doctor for eye health. Educative approach, almost 90% of people are aware of the negative effects of screen time. Though people are aware of the dangers, they do not wear protective eyewear or keep their screens close to their faces. Social change approach, most people believe that

their screen time should be limited by their workplaces, schools, and colleges, indicating a strong need for a social change approach. In general, we can conclude that excessive screen use can cause problems. People may be aware of the negative effects of screens, but they continue to ignore their eye health. We can even say that for some people or students, screen time is essential, and they are unable to reduce it. So, for those individuals, educating yourself on the ideal eye screen distance of 51 cm (20 inches) is essential, as is the use of protective eyewear.

Recommendations

Medical approach; use of hydrating eye drops and ointment should be made mandatory for those who have developed symptoms. Behavioral approach; For students, screen sensors should be developed specially for students (customized tabs and phones) who will give alert if screen is too close to their eyes. For working professionals' rule of 20-20-20 should be followed. Social change approach; Compulsory protective eye wear for students and working professionals. Frequently eye camps should be organized in schools colleges and offices. Screen should be made such type that maximum blue rays should be absorbed. To reduce the stress on eyes induced by constant exposure to screen, break should be given to employees apart from lunch break.

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