Original Article

Cross-sectional questionnaire study of ocular effects among IT professionals who use computers

Abstract

Aim: To detect the prevalence of ocular symptoms and other related problems experienced by IT professionals in OMR IT Corridor, Kelambakkam. **Background:** The dependence on the computer is rising with time. This will lead to numerous ill-effects in human beings out of which ocular manifestations play a prominent role (it is absolute necessary to know the hazards of the computer before we use it) previously done studies reveal that the awareness of ocular manifestation is less than 20%. Among the lesser known ocular manifestations, one of it is computer vision syndrome. Studies state that chorionic villus sampling (CVS) is one of the fast growing problems in the IT community that requires early identification and prevention to save our younger generations. Thus, this study would provide the necessary detection of CVS in IT people and to know, which group of people requires counseling and which group requires treatment. **Materials and Methods:** This cross-sectional questionnaire study included IT professionals who attended the Department of Ophthalmology, Chettinad Medical College, Chennai during this study period. Questionnaire survey study data were collected in computer users regarding the demography, duration of computer use (hour per day), years of computer use, working distance from computer, level of top of screen from eye level, use of antiglare screen, brightness and contrast adjustment, taking breaks during computer use. **Results:** During this study period, 300 patients were randomly selected from various IT companies. In which, 186 (62%) males and 114 (38%) females were participated. They were having ocular complaints in descending order such as eye strain (69%), headache (56%), dryness (49%), irritation (47%), burning sensation (41%), blurred vision (39%), itching (32%), watering (29%), redness (21%), and double vision (16%) **Interpretation:** The data were analyzed using SPSS software.

Key words: 20-20-20 rule, computer vision syndrome, IT professionals

Ayyakutty Muni Raja, Siddharam Janti, Adnan Matheen, Charanya Chendilnathan, Pandurangan Ramalingam

Departmenat of Ophthalmology, Chettinad Hospital and Research Institute, Kelambakkam, Chennai, Tamil Nadu, India

Address for the Correspondence:
Dr. Charanya Chendilnathan, A 401 Urbanville, Velachery Main Road, Velachery, Chennai - 600 042, Tamil Nadu, India.
E-mail: charanyachendilnathan@gmail.Com

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INTRODUCTION

Computer was invented by Charles Babbage in 1791, which was modified into a programmable computer by Manglebone in 1871.[1] In India first computer was used in Indian Statistical Institute in Calcutta in 1956.[1] INS survey was conducted in December 2013 which says total number of computer users in India was 150,000,000.[2] We cannot think the modern world without computers. The dependence on the computer is rising with time. This will lead to numerous disorders in human beings out of which ocular manifestations play a prominent role. Healthy eyes can easily maintain focus on the printed page. Characters on a computer screen however don't have this contrast or well-defined edges. These characters (pixels) are brightest at the center and diminished in intensity towards their edges. This makes it very difficult for our eyes to maintain focus and remain fixed on these images. Instead, our eyes drift out to a point called the "resting point of accommodation" that is approximately 30" and grows as we get older. When the demand at near work exceeds the normal ability of the eye to perform the job comfortably, one develops discomfort and prolonged exposure to the discomfort lead to a cascade of reactions that can be put together as Computer Vision Syndrome.

American Optometric Association defines chorionic villus sampling (CVS) as "the complex of eye and vision problems experienced during or related to computer use."[3] National Institute of Occupational

Safety and Health Survey has reported that visual symptoms occur in 75-90% as opposed to 22% musculoskeletal disorders of video display terminals (VDT) workers. CVS characterized by eye strain, eye tiredness, headache, blurred vision, dryness, irritation, redness, contact lens discomfort, neck shoulder, and back pain.[4-6]

MATERIALS AND METHODS

This cross-sectional was conducted in Department of Ophthalmology, Chettinad Medical College and Research Institute, OMR IT Corrider, Kelambakkam Chennai, Tamil Nadu, India during the period of October 2013 to February 2014. The study design was approved by the Human Research Ethical Committee of Chettinad University. Around 200-250, IT companies are in OMR IT corridor. Patients are taken randomly from various companies who are all attending ophthalmic out-patient department. Patients between age 20 and 50 years who are Computer users with complaints of eye strain, dry eye, blurred vision, redness, watering, headache neck and shoulder pain and have minimum 1 h exposure to any type of VDT such as desktop, laptop or both for at least 2 years are included in the study. Computer users of age <20, >50, contact lens users, those who are on treatment for thyroid disorders or Suffering from ocular inflammatory conditions like conjunctivitis, scleritis, uveitis, glaucoma, stye and blepharitis and Patients having any fundus pathology like optic atrophy, Diabetic retinopathy, Hypertensive retinopathy, papilledema are excluded from the study. Need for the study was explained to the patients, and their consent was obtained. Questionnaire survey study data was collected from patients regarding the demography, ocular complaints such as eyestrain, eye tiredness, headache, blurred vision, irritation, redness, duration of computer use (hour per day), years of computer use, their refractive status, whether they were using glasses or not, working distance from computer, level of top of screen from eye level, use of antiglare screen, brightness and contrast adjustment, taking breaks during computer use.

RESULTS

During this study period, 300 patients were randomly selected from various IT companies. In which 186 (62%) males and 114 (38%) females were participated. They were having ocular complaints in descending order like eye strain (69%), headache (56%), dryness (49%), irritation (47%), burning sensation (41%), blurred vision (39%), itching (32%), watering (29%), redness (21%), and double vision (16%). Most of them were working computers 7-9 h/day, and most of the males were working 16-20 years and females were working 11-15 years in our study [Tables 1 and 2]. Another study reported that the prevalence of the visual symptoms was significantly higher in the individuals who spent more than 4 h daily, working on VDT. The duration of the computer work was directly related to the eye symptoms, and that a longer duration tended to result in long-lasting complaints that persisted even after the VDT work was finished. Our study also revealed that the ocular complaints were reported more by the subjects who used computers for more than 6 h a day. Duration of computer use had significant relationship ($P = 0.034$). 36% males and 28% females were having refractive error that was corrected by spectacles [Tables 3 and 4]. Our study also found that the ocular complaints were more frequent in the subjects who did not use glasses and redness had a significant association. Most of them 115 (38%) were working in 21-25 inches working distance and they (72%) have a level of the top of the screen at the same level of eyes. Antiglare computer screen was used by 43% males and 29% females. Only 24% females had knowledge about computer brightness and contrast adjustment in our study. Taking

Table 1: Duration of computer usage in males and females

Duration of computer use (h/day)	Male (%)	Female (%)
Upto 3 h	5 (41.6)	7 (58.4)
4-6 h	43 (67.1)	21 (32.9)
7-9 h	89 (62.2)	54 (37.8)
10-12 h	49 (60.4)	32 (39.6)
P=0.034 significant		
Duration of computer use (years)		
Up to 5 years	57 (61.2)	36 (38.8)
6-10 years	71 (65.7)	37 (34.3)
11-15 years	37 (55.2)	30 (44.8)
16-20 years	21 (65.6)	11 (34.4)

P = 0.041 significant

Table 2: The gender distribution based upon distance and level of the top of screen

Distance from computer (inches)	Male (%)	Female (%)
10-15	43 (62.3)	26 (37.7)
16-20	60 (64.5)	33 (35.5)
21-25	69 (60)	46 (40)
26-30	14 (60.8)	9 (39.2)
P=0.028 significant		
Level of the top of screen		
Above the level of eyes	16 (69.5)	7 (30.5)
At the level of eyes	124 (57.6)	91 (42.4)
Below the level of eyes	46 (74.1)	6 (25.9)

P = 0.52 not significant

Table 3: The gender distribution based upon use of antiglare screen, brightness adjustment, taking breaks during computer use

Use of antiglare screen	Male (%)	Female (%)
Using screen	130 (43.3)	87 (29)
Not using screen	56 (56.7)	27 (71)
P=0.41 not significant		
Brightness adjustment		
Adjustment	148 (49)	71 (24)
No adjustment	38 (51)	43 (76)
P=0.34 not significant		
Breaks during computer use		
Took breaks	112 (37)	71 (24)
No breaks	74 (63)	43 (76)

P = 0.05 not significant

breaks during computer use by 112 males (37%) and 71 females (24%) [Table 5].

DISCUSSION

The prevalence of computer vision syndrome in our study was 97.4% of which eye strain was 69% that was correlates with Bali *et al.* 2007.[7] The duration of computer use is directly related to eye symptoms, and longer duration tends to result in long-lasting complaints even after the work was finished (Bergqvist and Knave, 1994; Sanchez-roman *et al.*, 1996, Shima *et al.*, 1995). Stella *et al.* (2007) observed more pronounced visual symptoms in people spending 6-9 h daily at computer. A higher proportion of subjects who had their computer screen at or above the eye level reported more symptoms (Bhanderi *et al.*, 2008; Jaschinski *et al.*, 1998; Bergqvist and Knave, 1994).[8-10]

Tear film maintains moisture and oxygen balance of cornea. Blink reflex facilitates resurfacing of the precorneal tear film. Normal blinking rate is 12-15 times/mt. It is 60% less than normal people while working with computer.[11] Other factors responsible for computer vision syndrome were poor workstation setup or improper use of work station, glare and reflections from the monitor and surroundings, uncorrected spectacle power Inappropriate glasses for computer use and Job nature and stress (Stella *et al.*, 2007; Cole, 2003).[12,13] Computer vision syndrome can be managed with work style modifications like chair adjustment — chairs with armrests, position of head slightly tilted downwards and the feet rest flat on the floor. Use suspended lights from ceiling and shade windows with curtains. Attach an antiglare screen in front of the monitor, minimize glare on computer by turning monitor away from the window and reducing strong overhead light, balancing overhead and window light with a desk lamp (Sheedy *et al.*, 2005). Use screen

Table 4: Correlation between various ocular complaints and duration and distance from computer

Ocular complaints	Duration of computer use (h/day)				Distance from computer (inches)			
	0-3 h (%)	4-6 h (%)	7-9 h (%)	10-12 h (%)	10-15 (%)	16-20 (%)	21-25 (%)	26-30 (%)
Eye strain	7 (3.3)	24 (11.5)	82 (39.6)	94 (45.6)	29 (14.1)	38 (18.3)	76 (36.7)	64 (30.9)
Headache	5 (2.9)	27 (15.9)	61 (36.6)	76 (44.9)	19 (11.2)	29 (17.1)	69 (40.8)	52 (30.9)
Dryness	8 (5.9)	22 (15.7)	49 (34.8)	62 (43.6)	21 (14.7)	28 (19.8)	51 (35.9)	42 (29.6)
Irritation	6 (4.1)	24 (16.2)	51 (34.5)	67 (45.2)	22 (14.8)	29 (19.5)	43 (29.3)	54 (36.4)
Blurred vision	4 (3.4)	16 (13.6)	43 (36.7)	54 (46.3)	10 (8.5)	19 (16.2)	47 (40.1)	41 (35.0)
Burning sensation	6	11 (8.8)	48 (38.8)	59 (47.6)	13 (10.5)	16 (12.9)	43 (34.7)	52 (41.9)
Itching	6 (6.1)	21 (21.6)	29 (29.8)	41 (42.5)	11 (11.3)	17 (17.5)	39 (40.2)	30 (31.0)
Watering	5 (5.7)	21 (24.2)	24 (27.6)	37 (42.5)	10 (1.3)	21 (24.1)	25 (28.7)	31 (35.9)
Redness	4 (6.3)	14 (22.3)	19 (30.1)	26 (41.3)	9 (14.2)	15 (23.8)	21 (33.4)	18 (28.6)
Double vision	5 (10.2)	11 (22.4)	14 (28.5)	19 (38.9)	6 (12.2)	10 (20.4)	19 (38.7)	14 (28.7)

Table 5: Correlation between various ocular complaints and refractive status, antiglare screen use, brightness adjustment and breaks during computer use

Ocular complaints	Glass		Antiglare screen		Brightness adjustment		Breaks during computer use	
	User (%)	Nonuser (%)	User (%)	Nonuser (%)	Adjustment (%)	No adjustment (%)	Taking breaks (%)	Not taking breaks (%)
Eye strain	62 (29.9)	145 (70.1)	79 (38.1)	128 (61.9)	72 (34.7)	135 (65.3)	81 (39.1)	126 (60.9)
P=0.004 significant								
Headache	47 (27.8)	122 (72.2)	62 (36.7)	107 (63.3)	71 (42.1)	98 (57.9)	71 (42.1)	98 (57.9)
P=0.032 significant								
Dryness	39 (27.4)	103 (72.6)	47 (33.1)	95 (66.9)	59 (41.5)	83 (58.5)	58 (40.8)	84 (59.2)
P=0.012 significant								
Irritation	41 (27.7)	107 (72.3)	53 (35.8)	95 (64.2)	57 (38.5)	91 (61.5)	61 (41.2)	87 (58.8)
P=0.024 significant								
Blurred vision	32 (27.3)	75 (72.7)	47 (40.1)	70 (59.9)	47 (40.2)	70 (59.8)	43 (36.7)	74 (63.3)
P=0.048 significant								
Burning sensation	38 (30.6)	86 (69.4)	49 (39.5)	75 (60.5)	37 (29.8)	87 (70.2)	47 (37.9)	77 (62.1)
P=0.02 significant								
Itching	31 (31.9)	66 (68.1)	34 (35.1)	65 (64.9)	41 (42.2)	56 (57.8)	34 (35.1)	63 (64.9)
P=0.05 not significant								
Watering	27 (31.1)	60 (68.9)	29 (33.3)	58 (66.7)	36 (41.4)	51 (58.6)	32 (36.7)	55 (63.3)
P=0.62 not significant								
Redness	26 (41.2)	37 (58.8)	28 (44.4)	35 (55.6)	27 (42.8)	36 (57.2)	27 (42.8)	36 (57.2)
P=0.05 not significant								
Double vision	19 (38.7)	30 (61.3)	27 (55.1)	22 (44.9)	18 (36.7)	31 (73.3)	21 (42.8)	28 (57.2)

P = 0.51 not significant

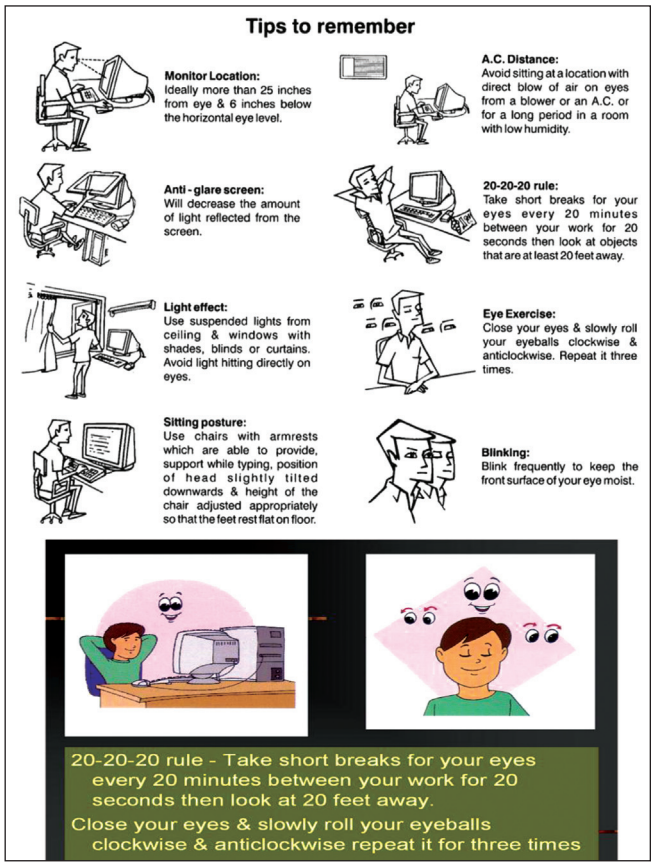

Figure 1: Steps to prevent computer vision syndrome

mounted document holder at the same plane of the computer. Ideal viewing area of the monitor is 6 inches, below the horizontal eye level. Monitor should be more than 25 inches straight from eyes. Work with fonts of darker shades on the lighter background.[14] Avoid sitting in front of A.C or in a room with low humidity. Eye breaks during computer use by 20-20-20 rule as suggested by Anshel (2005) [Figure 1]. Take short breaks every 20 min for 20 s and look away 20 feet.[4-6] Even people with normal vision would need glasses just for computer use. They allow eyes to focus more clearly and reduce strain from monitor use. +0.25 D power is usually added in the glass to move out eye's focal point closer without using accommodation. Bifocal, progressive lenses also can help in reducing CVS (Sheedy, 2000). Preservative free Artificial tears eye drops form the mainstay of management of dry eyes in CVS.[15]

REFERENCES

1. Available from: http://www.en Wikipedia.org/wiki/computer/page-112. [Last accessed on 2014 Feb 10].
2. Available from: http://www.internetworldstats.com/asia/in.htm. [Last accessed on 2014 Feb 10].
3. Computer Vision Syndrome. American Optometric Association. Available from: http://www.aoa.org/. [Last accessed on 2014 Feb 10].
4. Computer Vision Syndrome 2011. Available from: http://www.eophtha.com. [Last accessed on 2014 Feb 10].
5. Adobe Acrobat. Computer Vision Syndrome; Manual Book; Latest Layout. Available from:http://www.rajaneyecare.com/. [Last accessed on 2014 Feb 10].
6. Available from: http://www.shankaranethralaya.com/patient care/cvc.html. [Last accessed on 2014 Jan 20].
7. Bali J, Navin N, Thakur BR. Computer vision syndrome: A study of the knowledge, attitudes and practices in Indian ophthalmologists. Indian J Ophthalmol 2007;55:289-94.
8. Freudenthaler N, Neuf H, Kadner G, Schlote T. Characteristics of spontaneous eyeblink activity during video display terminal use in healthy volunteers. Graefes Arch Clin Exp Ophthalmol 2003;241:914-20.
9. Bali J, Navin N, Thakur BR. Computer vision syndrome: A study of the knowledge, attitudes and practices in Indian ophthalmologists. Indian J Ophthalmol 2007;55:289-94.
10. Raj K. Computer vision syndrome: Recognition and control in software professionals. J Hum Ecol 2009;28:67-9.
11. Keith R. Survey reveals eye suffering among computer users. Las Vegas Rev J 2008;28:34-45.
12. Kesavachandran C, Rastogi SK, Das M, Khan AM. Working conditions and health among employees at information technology - enabled services: A review of current evidence. Indian J of Med Sci 2006;60: 300-7.
13. Izquierdo JC, García M, Buxó C, Izquierdo NJ. Factors leading to the computer vision syndrome: An issue at the contemporary workplace. Bol Asoc Med P R 2007;99:21-8.
14. Griffiths KL, Mackey MG, Adamson BJ. The impact of a computerized work environment on professional occupational groups and behavioural and physiological risk factors for musculoskeletal symptoms: A literature review. J Occup Rehabil 2007;17:743-65.
15. Schlote T, Kadner G, Freudenthaler N. Marked reduction and distinct patterns of eye blinking in patients with moderately dry eyes during video display terminal use. Graefes Arch Clin Exp Ophthalmol 2004;242:306-12.

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