

Evaluation of Risk Factors Contributing to Video Display Terminal Syndrome

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ABSTRACT

Introduction: There were many studies where computer users were surveyed and symptoms were attributed to use of computer but as the symptoms of patients were not always visible, many people using VDT didn't attribute computer for symptoms of VDTs. This Study spread awareness about VDTs among the outdoor patients and office staff workers at Tertiary hospital. In this study, we have screened computer users for ocular complaints along with risk factors and association between them.

Material and Methods: This present study was carried out among the outdoor patients who uses computer for at least one year and presenting with eye complaints at Tertiary Care Centre and office staff of Medical Institute in Karad, Maharashtra, India, where the uses of computers required, during the period of November 2016 to May 2018. 180 Office staff worker and OPD patients, 25-50 years of age, were surveyed. All the participants were subjected to routine clinical examination. After ocular examination, subjects were asked to respond to a predefined questionnaire

Results: Eyestrain, Dryness and Redness were major complaints in male while headache and burning were in females.

Conclusion: Factors like working hours on a computer, whether they were using spectacles or not, their distance from the computer screen, the level of the eyes, type of monitor, the brightness adjustment, use of an antiglare screen, rule of 20-20-20 and the habit of taking breaks contributed to different ocular complaints.

Keywords: Risk Factors, Video Display Terminal Syndrome

INTRODUCTION

Using VDTs long time may cause disease of ocular, physical and mental health, which is called video display terminal (VDT) syndrome or Computer Vision Syndrome (CVS). The American Optometric Association defines CVS as "The complex of eye and visual problems experienced during or related to Computer use"¹

According to the National Institute of Occupational Safety and Health, computer vision syndrome affects about 90% of the people who spends three or more hours a day at a computer.²

The use of computers in the era of information technology has given new heights to the professional success rate. The information superhighway has become a famous buzz in most setups. Computers and smartphones are used every day all over the world, in many different ways. They are everywhere from kitchen to concrete mixtures, from planes to pockets. Computers and cell phones help with business

and work from home opportunities. Social networking and games are also a big part of everyday life of people.³

Many studies are done where computer users were surveyed and symptoms were attributed to use of computer also but as the symptoms of patients are not always visible, many people using VDT won't attribute computer for symptoms of VDTs. Awareness is major factor in reducing symptoms load.

Several studies have revealed various visual problems with VDTs (Coe, Cuttle, McClean and Warden, 1980; National Institute for Occupational Safety and Health, 1981) Specifically, most of the studies found that more than 50 percent of VDT workers indicated that they occasionally experienced some type of ocular discomforts. Most of these studies are independent in nature; they were not comparative studies. An article in the Science News Journal presented several VDT studies conducted by Michael J. Smith of the University of Wisconsin-Madison (Hendrick, 1988). One of the studies found that the most VDT complaint was vision disorder. The study revealed 90 percent of VDT users experience eyestrain and 75 percent have eye focusing difficulties at work.⁴

The Fifth (1993) International Conference on Human Computer Interaction (HCI) presented several research papers on VDTs. Many of these research papers addressed VDT work and health related issues. A specific research paper (Bruno, 1993) presented the following visual problems affecting VDT operators:

1. Increased posture constraints in operators
2. Reduced dimension of the details on the VDT
3. Limited possibility to use far vision due to physical obstructions (walls, dividers, windows, blinds, etc.)⁵

In 2017, Jatiender Bali et al did study on review of computer vision syndrome study concluded that CVS is a repetitive stress disorder characterized by a symptom complex of eye-strain, tired eyes, irritation, burning sensations, redness of eyes, dry eyes, blurred, and double vision apart from nonocular complaints like neck, shoulder, and back pain

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experienced by computer users. Several factors have been linked to these symptoms. Many treatment modalities have been described in literature and still more in anecdote. The treatment needs to be tailored to the individual patient. A specially designed ocular examination for computer users and associated counseling about the current good practices in computer use would go a long way in preventing loss of

productivity and morbidity from the condition. In Present study To evaluate risk factors contributing to video display terminal syndrome, 25-50 years of age.⁶

Study was done with the objective to study risk factors of video display terminal syndrome, to study ocular complaints in video display terminal syndrome and to evaluate the factors and their impact on ocular complaints.

Factors		Female (%)	Male (%)
Duration of use	<3 hours	42	38
	3-6 hours	21	29
	>6 hours	37	33
Spectacle	Spectacle users	58	42
	non-users	42	58
ARC for spectacles	Using	37	23
	Not Using	63	77
Distance from computer screen	20-24 inch	61	44
	more or less	39	56
Level of the top of screen	Below eye level	47	54
	At or above	53	46
Use of Anti Glare Screen	Using screen	56	44
	Not using	44	56
Brightness adjustment	Adjustment	54	46
	No adjustment	46	54
Breaks during computer use	Took breaks	53	56
	No breaks	47	44
Use of 20-20-20	Yes	21	42
	No	79	58
Use of Lubricating Eye drop	Yes	26	28
	No	74	72
Schirmer's I test	>15 mm	37	44
	10-15 mm	42	34
	5-10 mm	21	22
Tearfilm Break-Up Time	<10 sec	37	22
	>10 sec	63	78
Blink Rate (Blinks/min)	<16	32	32
	16-20 (Normal)	36	17
	>20	32	51

Table-1: Distribution of different factors affecting ocular problems

Ocular complaints		Females (%)	Males (%)
Eye strain	Present	70	89
	Absent	30	11
Redness	Present	42	59
	Absent	58	41
Dry Eye	Present	72	86
	Absent	28	14
Headache	Present	58	42
	Absent	42	58
Itching	Present	49	51
	Absent	51	49
Burning	Present	54	49
	Absent	46	51
Double vision	Present	33	34
	Absent	67	66
Watering	Present	68	67
	Absent	32	33

Table-2: Different ocular complaints among the computer users

	% of Subject	Duration of use			Spectacle user	Use of ARC		Distance from screen	Level of screen		Antiglare screen		Brightness Adjustment	Breaks during use		Use of 20-20-20		Type of Monitor		Use of eye-drops					
		<3 Hours	3-6 Hours	>6 Hours		User	Non-user		Below the eye level	At or above eye level	User	Non-user		Adjusted	Not adjusted	Taken	Not taken	User	Non user		LCD	CRT			
Eye Strain	Present	62.8	26.1	16.1	20.6	30.0	32.8	15.0	47.8	18.9	43.9	31.7	31.1	30.0	32.8	33.9	28.9	33.3	29.4	10.6	52.2	48.9	13.9	14.4	48.3
	Absent	37.2	13.9	10.6	12.8	23.9	13.3	17.2	20.0	20.0	17.2	20.6	16.7	16.7	20.6	12.8	24.4	21.7	15.6	7.2	30.0	23.3	13.9	14.4	22.8
	P-value		0.8442			0.0441*		0.0028*		0.0025*		0.5376		0.7581		0.0134*		0.538		0.6897		0.0384*		0.0277*	
Redness	Present	52.8	21.7	13.3	17.8	23.3	29.4	12.2	40.6	25.0	27.8	27.2	25.6	20.6	32.2	25.6	27.2	31.1	21.7	12.2	40.6	30.6	22.2	17.8	35.0
	Absent	47.2	17.2	11.7	18.3	15.6	31.7	25.6	21.7	15.0	32.2	21.1	26.1	17.2	30.0	27.8	19.4	23.3	23.9	16.7	30.6	26.7	20.6	6.1	41.1
	P-value		0.7498			0.1289		<0.0001*		0.0346*		0.3738		0.76		0.0237*		0.2314		0.0991		0.8808		0.0015*	
Dry Eye	Present	71.7	26.1	11.1	34.4	43.3	28.3	54.4	17.2	55.6	16.1	23.3	48.3	31.1	40.6	53.9	17.8	33.3	38.3	23.3	48.3	56.7	15.0	11.1	60.6
	Absent	28.3	11.1	10.6	6.7	15.0	13.3	16.1	12.2	9.4	18.9	14.4	13.9	8.3	20.0	15.0	13.3	21.1	7.2	9.4	18.9	17.2	11.1	23.3	5.0
	P-value		0.0012*			0.403		0.0176*		<0.0001*		0.0268*		0.0391*		0.0069*		0.0008*		1		0.0148*		0.0148*	
Headache	Present	74.4	26.7	31.1	16.7	35.6	38.9	29.4	45.0	28.3	46.1	48.9	25.6	44.4	30.0	45.6	28.9	31.7	42.8	22.8	51.7	50.6	23.9	18.3	56.1
	Absent	25.6	13.9	5.6	6.1	10.6	15.0	11.7	13.9	7.2	18.3	8.9	16.7	10.6	15.0	17.8	7.8	15.6	10.0	9.4	16.1	21.7	3.9	6.7	18.9
	P-value		0.0353*			0.4956		0.4912		0.2851		0.0005		0.0928		0.3764		0.0399		0.0148*		0.0357*		0.0357*	
Itching	Present	49.4	19.4	12.8	17.2	21.7	27.8	11.7	37.8	26.7	22.8	22.2	27.2	25.6	22.8	26.1	23.3	8.9	40.6	29.4	20.0	15.6	33.9	40.0	9.4
	Absent	50.6	20.6	13.9	16.1	25.0	25.6	16.7	33.9	23.3	27.2	26.1	24.4	24.4	26.1	25.6	25.0	28.9	21.7	12.8	37.8	30.6	20.0	16.1	34.4
	P-value		0.9124			0.4595		0.1874		0.3711		0.3758		0.553		0.7679		<0.0001		0.4666		0.4666		0.0001*	
Burning	Present	49.4	19.4	16.1	13.9	19.4	30.0	12.2	37.8	24.4	25.0	24.4	24.4	23.9	25.6	25.0	24.4	28.3	21.1	11.7	37.8	26.1	23.3	14.4	35.0
	Absent	50.6	20.6	12.8	17.2	27.2	23.3	16.1	33.9	25.6	25.0	25.6	25.0	22.8	27.8	26.7	23.9	26.7	23.9	10.0	40.6	33.9	16.7	17.2	33.3
	P-value		0.5044			0.0541		0.321		1		1		0.7652		0.8815		0.5527		0.5895		0.0677		0.0677	
Double Vision	Present	34.4	13.9	9.4	11.1	18.3	16.1	9.4	24.4	15.6	18.9	20.0	14.4	14.4	20.0	16.1	18.3	18.9	15.6	7.2	27.2	19.4	15.0	10.6	23.9
	Absent	65.6	26.1	17.2	22.2	28.3	37.2	18.9	46.7	34.4	31.1	30.6	35.0	32.2	33.3	35.6	30.0	36.1	29.4	14.4	51.1	40.6	25.0	21.1	44.4
	P-value		0.9727			0.2125		1		0.433		0.1602		0.4321		0.3515		1		1		0.5237		0.5237	
Watering	Present	66.1	29.4	16.7	20.0	32.8	33.3	20.0	46.1	33.9	32.2	33.3	32.8	29.4	36.7	31.7	34.4	35.0	31.1	16.1	50.0	39.4	26.7	18.9	47.2
	Absent	33.9	20.6	3.3	10.0	14.4	19.4	8.3	25.6	16.1	17.8	19.4	14.4	17.2	16.7	20.0	13.9	20.0	13.9	5.6	28.3	20.6	13.3	12.8	21.1
	P-value		0.0322*			0.4314		0.4868		0.753		0.0112*		0.435		0.2073		0.527		0.255		0.255		1	

Table-3: Ocular Complaint

MATERIAL AND METHODS

This prospective observational study was carried out in tertiary care centre, Karad in Maharashtra, India from November-2016 to April-2018. Study was approved by Institutional Ethical Committee. As per Survey-System software (version 11) calculation, 180 subjects using computer or any other VDT for at-least one year, aged between 25 to 50 years, were enrolled. Subjects with prior ocular pathology or ocular surgery, taking any medication causing dry eyes were excluded. After taking consents, subjects were given predefined questionnaire to answer regarding their demographic details, daily working hours on a computer, their refractive status, whether they were using spectacles or not, their distance from the computer screen, the level of the eyes, type of monitor, the brightness adjustment, use of an antiglare screen and the habit of taking breaks. The ocular complaints like ocular strain, headache, redness, dryness, itching, watering and double vision were sought.

Subjects were categorized according to duration of use e.g. <3 hours, 3-6 hours and >6 hours a day. They were asked to follow up in OPD for further evaluations. Data of 180 subjects were analyzed with the help of SPSS software (version 19).

RESULTS

Mean age of subjects who participated in this study was 32.94 (\approx 33) years, with range of 25 to 50 years. Out of these 180 subjects who responded, 57 (31.66%) were females and 123 (68.33%) were males.

Table-1 shows distribution of different factors affecting ocular problems. Table-2 shows different ocular complaints among the computer users. Out of all this complaints, Eye strain, Dry Eye and Redness were major problems in male while Headache and Burning were major complaints among the females (Table 2).

It was found that Eye strain and Redness were significantly associated with not using ARC among spectacle users. Eye strain and Redness had a significant association in subjects not maintaining proper distance from the computer. Data also depicts that dryness and watering were more and had a significant association when subjects did not maintain screen level below the eyes. Similarly, Dry eye was reported significantly by a greater number of subjects who did not use antiglare screen (table-3).

It was also observed (Table 3) that redness and headache were reported by a greater number of subjects who work with computers without adjusting the brightness of the screen. Dryness and itching found to be significantly associated with subjects those not taking breaks during computer use. Itching was significantly less among those who took breaks regularly. It was also found that eyestrain and headache were high when subjects used LCD monitor instead of CRT monitor and had a significant association.

Table 3 shows that use of Lubricating eye drops to prevent dry eyes was significantly associated for Eyestrain, redness, dryness and Itching.

DISCUSSION

In 2001, Mocci F, Serra A, Corrias GA Stated Psychological factors and visual fatigue during VDT work were correlated with the age and gender of the subjects.

Here in present study, the female subjects used computers for lesser time periods than the males, as well as, most of them maintained a proper viewing distance from the computer screen, but we did not find any significant association with the age and gender of the subjects with these complaints.⁷

In 2005, Kanitkar K, Carlson AN, Richard concluded reported that the prevalence of the visual symptoms was significantly higher in the individuals who spent more than 4 hours daily, working on video display terminals. Our study also revealed that the ocular complaints were reported more by the subjects who used computers more, with significant associations for dry eye, Headache and Watering. Although more number of males used computers for more than 6 hours, we did not find any significant association of gender with the ocular complaints.⁸

In 1995, Taptagaporn S, Sotoyama M, et al found that decreasing the viewing distance produced a larger increase in the eyestrain when the VDTs were at eye level. Another study showed that the Aesthenopia was highest when the viewing distance was less than 12 inches, which was statistically significant. Similarly, In our study we concluded that eyestrain and Redness had a significant association in subjects not maintaining proper distance of 20-24 inch from the computer, also depicts that dryness and watering were more.⁹

In 1990, C Rechichi, L Scullica recommended that the location of middle point of the VDT should be 5-6 inches below the straight line of the users' vision, which decreases not only the dry eye, but also the degree of the spasm and pain in the neck muscles. In our study subjects had a significant association dryness and headache when subjects did not maintain screen level below the eye level.¹⁰

United States Occupational Safety and Health Administration (OSHA) has recommended that the center of the computer monitor should normally be located 15–20° below the horizontal eye level and that the entire visual area of the display screen should be located so that the downward viewing angle is >60. In our study, it was found that the complaints were less when the subjects maintained the top of the screen level below the eyes, but a significant association was found only for eyestrain. Similar results were found in two such studies and therefore a downward gaze was recommended so as to work comfortably on a VDT.

In 2008, Office Ergonomics Handbook conducted study on Occupational Health Clinics for Ontario Workers. The conditions of high illumination and sensitivity to the glare due to computer use were shown to increase the reading time and to decrease the attention to the task. In our study found that redness and headache were reported by more number of subjects who work with computers without adjusting the brightness of the screen. Dryness and itching found to be significantly associated with subjects those not taking breaks

during computer use. Itching was significantly less among those who took breaks regularly.¹¹

In 2005, B Levy, G Wagner, K Rest and J Weeks did study on Preventing Occupational Disease and Injury Research has shown that taking frequent breaks while using the computer helps the muscles of the eye to relax, thus decreasing the eye fatigue and headache. In our study, eyestrain and burning of the eyes were found to be significantly associated with the subjects who did not take breaks during the computer use.¹²

CONCLUSION

Use of computer from ideal distance and keeping it below the eye level, use of anti-glare screen, keep the brightness auto-adjusted, taking frequent breaks during work can reduce most of the symptoms related to Video display terminal syndrome. Many of the preventing measures like, use of Anti-refractive coating for spectacles, use of 20-20-20 rule and usage of lubricating eye drops, were not taken by majority of the people.

So by spreading awareness about these measures, most problems related to VDTS can be prevented and Quality of life can also be improved among the VDT users.

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REFERENCES

1. Adeoye BF. A comparative study of visual problems between video display terminal operators in a developed and a developing country (Master's thesis, Eastern Illinois University).
2. Yashi Bansal, Tania Moudgil. Computer Vision Syndrome, November 2014, volume 2 issue 11, ISSN 2278 – 0211 (Online)
3. Akinbinu TR, Mashalla YJ. Knowledge of computer vision syndrome among computer users in the workplace in Abuja, Nigeria. *Journal of Physiology and Pathophysiology*. 2013;4:58-63.
4. Guillon M, Maissa C, Pouliquen P, Delval L. Effect of Povidone 2% Preservative-free Eyedrops on Contact Lens Wearers With Computer Visual Syndrome.: Pilot Study. *Eye and contact lens*. 2004;30:34-9.
5. Adeoye BF. A comparative study of visual problems between video display terminal operators in a developed and a developing country (Master's thesis, Eastern Illinois University).
6. Bali J, Neeraj N, Bali RT. Computer vision syndrome: A review. *Journal of clinical ophthalmology and research*. 2014;2:61.
7. Kanitkar K, Carlson AN, Richard Y. Ocular problems associated with computer use: The ever-increasing hours spent in front of video display terminals have led to a corresponding increase in visual and physical ills. *Review of Ophthalmology E-Newsletter*. 2005;12(04).
8. Chavada VK, Panigrahi KC. Profile of Ocular complaints among computer users: An eye opener. *Annals of Pharma Research*. 2017;1:25-31.
9. Taptagaporn S, Sotoyama M, Saito S, Suzuki T. Visual

comfort in VDT workstation design. *Journal of human ergology*. 1995;24:84-8.

10. Mocci F, Serra A, Corrias GA. Psychological factors and visual fatigue in working with video display terminals. *Occupational and Environmental Medicine*. 2001;58:267-71.
11. Rivilis I, Van Eerd D, Cullen K, Cole DC, Irvin E, Tyson J, Mahood Q. Effectiveness of participatory ergonomic interventions on health outcomes: a systematic review. *Applied ergonomics*. 2008;39:342-58
12. Levy BS, editor. Preventing occupational disease and injury. American Public Health Association; 2005.

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