 DOI: 10.18231/2395-1451.2017.0090

Ocular Symptoms in computer users- A clinical study

Sangeeta Agarwal[1,*], Akash Srivastava[2]

[1]Associate Professor, Govt. Medical College, Azamgarh, [2]Junior Resident, Dept. of Ophthalmology, B.R.D. Medical College, Gorakhpur, Uttar Pradesh

***Corresponding Author:**
Email: sangeetaeyecare@gmail.com

Abstract

Objective: To determine the prevalence of computer vision symptoms in professional computer users working under acceptable ergonomics condition.

Materials and Methods: A spot survey was carried out on subjects using computer in institutes, colleges and banks. A questionnaire was used and all filled proformas were collected and checked for the response.

Result: Ocular symptoms are very common among the computer users with a prevalence of 82.46%. There is no remarkable sex disparity in prevalence of symptoms. It may vary from being occasional to routine. The presbyopic persons are more symptomatic, the prevalence of symptoms in them is 88.96% in comparison to 81.48% of pre-presbyopic persons. Eyestrain is the most frequently reported symptom by the computer users and it affects 61.67% subjects. Occasional double vision is the least reported symptom and it affects 8.67% subjects. As the per day working hours at computer increase, the prevalence and frequency of symptoms felt everyday.

Keywords: Computer vision syndrome, Computer users, Ergonomics.

Introduction

Development and digital devices are inseparable, therefore modern society continues to move towards greater use of electronic devices for both work and leisure activities. Moreover computer teaching is a part of curriculum for school going children. Computer use has become ubiquitous presently.

Computer and other visual display terminals have become an integral part of our lives. Increased and excessive usage of computer has resulted in digital eye syndrome.

Digital eye strain has multi-factorial etiology and thus a multi –directional approach is needed to get relief from this entity.

The causes of visual fatigue are described in terms of environmental visual status of viewer and constitutional.

The CVS symptoms have been divided broadly as follows-

a. Asthenopic includes eyestrain, tired and sore eyes.
b. ocular surface related is dry eyes, contact lens problems.
c. Extraocular, which mainly involves muscles of neck, back and Shoulder.
d. Visual includes blurred vision, or double vision.

Human visual system is not friendly with computer screen. There is tremendous amount of difference between viewing at a digital screen than reading a printed material and situation is further aggravated if subject is having any error in refraction. Digital screen provide a dynamic signal which causes eye muscles to overexert, the tasks equivalent of subjecting the eyes to 60 push ups a minute.

Materials and Methods

Subject Selection: A spot survey was carried out on subjects using computer in institutes, colleges and banks. A questionnaire was used and all filled proformas were collected and checked for the response.

Inclusion criteria: subjects with BCVA 6/6.

Exclusion criteria: subjects with ocular surface disease, amblyopia, convergence insufficiency and un-corrected refractive error.

Only those students, teachers and employees are included who are aware of computer ergonomics. Since there is direct relation on number of hours spent on digital screen to digital strain, we choose subjects working for 2 hours or more on computer at a stretch per day in our study.

The persons included in the study were interviewed and examined with a preset detailed proforma given below:

1. Personal information:
   a. Name……
   b. Address……
   c. Contact No. (if any)……
2. Information about work:
   a. Working place……...
   b. Nature of work: student/computer professional/others
   c. No. of working hours on computer/day……
   d. Working time: Day/Night; Continuous/Shift [√]

e. Number of days of work/week: ……Days/week

3. Symptoms felt:

[Grading 1 → Everyday
2 → Frequently
3 → Occasionally
4 → Never

Ocular symptoms:

a.	Tired eyes		1/2/3/4		[√]		
b.	Eye strain		1/2/3/4		[√]		
c.	Sore Eyes		1/2/3/4		[√]		
d.	Periodic blurring of near vision	1/2/3/4		[√]			
e.	Periodic blurring of distant vision		1/2/3/4		[√]		
f.	Dry eyes		1/2/3/4		[√]		
g.	Slowness in changing the focus of eye	1/2/3/4		[√]			
h.	Red eyes		1/2/3/4		[√]		
i.	Burning eyes		1/2/3/4		[√]		
j.	Excessive tearing		1/2/3/4		[√]		
k.	Double vision			1/2/3/4		[√]	
l.	Light sensitivity		1/2/3/4		[√]		

Associated Symptoms:

a.	Headache		1/2/3/4		[√]		
b.	Neck, shoulder and back pain		1/2/3/4		[√]		

Any other symptom (specify) 1/2/3/4 [√]

Result

Out of total 1049 cases, 913 subjects (596 males and 317 females) were between the ages 16 to 40 years (pre-presbyopic age group), while 136 subjects (117 males an 19 females) were between 41 to 65 years (presbyopic age group). Males out numbered females in each age group.

Table 1: Distribution of subjects according to working hours in various age groups

Working hours/day	Prepresbyopic group 16 to 40 years		presbyopic group 41 to 65 years		Total		Grand Total
	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)	
2-4	370 (35.27)	202 (19.25)	-	-	370 (35.27)	202 (19.25)	572 (54.52)
>4-6	162 (15.44)	86 (8.19)	85 (8.10)	15 (1.43)	247 (23.54)	101 (9.62)	348 (33.17)
>6	64 (6.10)	29 (2.76)	32 3.05)	04 (0.38)	96 (9.15)	33 (3.14)	129 (12.29)
Total	596 (56.81)	317 (30.21)	117 (11.15)	19 (1.81)	713 (67.97)	336 (32.03)	1049 (100.0)
G. Total	913 (87.03%)		136(12.97%)		1049(100.0%)		1049(100.0%)

Out of total cases, majority of subject (54.52%) were working on computer for 2 to 4 hours per day.

Table 2: Table showing frequency of symptoms

Sex	Total subjects	Subject without symptoms (%)	Subject with symptoms 865 (82.46%)	
			Subject with only one symptom (%)	Subject with multiple symptoms (%)
Male	713	126 (17.67%)	61 (8.55%)	526 (73.77%)
Female	336	58 (17.26%)	31 (9.22%)	247 (73.51%)
Overall	1049	184 (17.54%)	92 (08.78%)	773 (73.68%)

The percentage of subjects having symptoms is 82.46% in this study.

Table 3: Occurrence of symptoms in relation to age

Age (in years)	Total subjects	Subject without symptoms (%)	Frequency of symptoms		
			Occasionally (%)	Frequently (%)	Everyday (%)
16-40 (pre-presbyopic)	913	744(81.48)	506 (55.42)	145 (15.88)	93 (10.18)
>41-65 (presbyopic)	136	121 (88.96)	56 (41.17)	38 (27.94)	27 (19.85)
Overall	1049	865 (82.46)	562 (53.57)	183 (17.44)	120 (11.43)

More (88.96%) subjects in the presbyopic age group are having symptoms as compared to the pre-presbyopic age group (81.48%). Everyday and frequent occurrence of symptoms is also more in presbyopic age (47.79%) as compared to pre-presbyopic group (26.06%).

Table 4: Occurrence rate of symptoms in relation to working hours/day

Working hours	Total subjects	Subject with symptoms (%)	Frequency of symptoms		
			Occasionally (%)	Frequently (%)	Everyday (%)
2 to 4	572	455(79.54)	328 (57.34)	81 (14.16)	46 (8.04)
>4 to 6	348	293 (84.19)	185 (53.16)	61 (17.52)	47 (13.51)
>6	129	117 (90.69)	49 (37.98)	41(31.78)	27 (20.93)
Overall	1049	865 (82.46)	562 (53.57)	183 (17.44)	120 (11.43)

Table 5: Symptoms reported by the subjects

S. No.	Symptoms	No. of subjects	Percentage (%)
A.	**Ocular**		
1.	Eye strain	647	61.67
2.	Excessive tearing	449	42.80
3.	Sore eyes	445	42.42
4.	Tired eyes	430	40.99
5.	Burning eyes	422	40.22
6.	Light sensitivity	402	38.32
7.	Slowness in changing focus	313	29.83
8.	Red eyes	298	28.40
9.	Dry eyes	288	27.45
10.	Periodic blurring of distant vision	275	26.21
11.	Periodic blurring of near vision	256	24.40
12.	Double vision	91	8.67
B.	**Associated**		
1.	Headache	554	52.81
2.	Neck, shoulder and back pain	539	51.38

Among the symptoms reported, eyestrain was the most frequent, reported by 647 (61.67%) computer users.

Discussion

With the advancement and modernization of technology, our country boasts around 15 million computer users. In this group of people many of them develop ocular symptoms and as the statistics reveal nearly 60 million people worldwide suffer from such symptoms.

Many of investigators have found the eyestrain as a common symptom reported by the computer users viz., Ostberg 0 (1975),[1] Smith (1979)[2] and Jaschinski-Kruza (1990).[3] Eyestrain is due to repetitive stress on the eye muscles caused by the need of constant refocusing of the dynamic images of the computer screen.

The next most frequent ocular symptom in the study was excessive tearing and was reported by 449 (42.80%) subjects. The excessive tearing caused by computer use is reflex tearing due to dryness of cornea occurring due to decreased blink rate and the visual fatigue.

Sore eyes were reported by 445 (42.42%) subjects, feeling of sore eyes during computer use can be caused by the stress over the extra-ocular muscles and accommodation. The dry eyes caused by decreased blink rate during computer use can also lead to the condition.

Tired eyes were reported by 430 (40.99%) subjects; Tsubota (1993)[4] showed tiredness of eyes to

be directly related to the work required of extra ocular muscles during work at computer.

Burning eyes were reported by 422 (40.22%) subjects. Burning eyes is also a feature of visual fatigue encountered in computer users, the cause can be the strain on the eye muscles due to over work and the dryness of eyes caused by the computer work.

Light sensitivity was reported by 402 (38.32%) subjects, the cause of light sensitivity experienced by computer users can be the glare of the computer screen (direct or diffuse) and the flickering nature of the computer screen which is a dynamic signal, in that the screen is constantly being "redrawn" and our eyes have to constantly refocus to keep the images sharp.

Slowness in changing focus was reported by 313 (29.83%) subjects. It is caused by the repetitive stress on the eye muscles. The computer work is visually demanding, with our eyes shifting and focusing between the screen, document and keyboard many-many times during a daytime work. Keith Rogers (1997)[5] also reported itcas a common symptom. Dry eyes were reported by 288 (27.45%) subject it is one of the frequent symptoms mentioned by many investigators viz. Vo van Toi and Grounauer PA (1992),[6] Tsubota and Nakamori (1993),[4] Keith Rogrs (1997)[5] and Nakaishi H (1999).[7] Normally we blink 12 to 15 times per minute but while working on computer, which require particular visual attention, the blinking rate may even drop to less than 5 times/min. Tears coating the eyes evaporate more rapidly during long non-blinking phases and cause dry eyes. Low humidity in the environment (less than 40%) can also amplify the problem of dry eyes.

Mc Kinnon (1994)[8] reported neck extension and forward head posture, while acceptable for the visual system, had been associated with both discomfort and disease. Ankrum and Nemeth (1995)[9] reported that lower monitor placement could increase the acceptable option that users have for neck movement.

Conclusion

Comparing the symptomatology of computer users, it is clear that much more subjects in the presbyopic age group than the pre-presbyopic group are reporting each symptom. The compromisation of accommodation is one of the reasons. Visual fatigue is related to the stress placed on accommodation. Presbyopics are more prone for dry eyes and thus can be affected more while using computers.

The presbyopic people often run into problems because their reading glasses are geared to look at books held 16 inches away, rather than computer screens that are typically two feet away. They have to make frequent focusing changes between the key board, screen and reference material and this work is more tiring for presbyopics than the pre-presbyopic people.

References

1. Ostberg O (1975): CRTs pose health problems for operators. International Journal of Occupational Health and Safety. 44(6):24-46.
2. Smith WJA (1979): A review Literature relating to visual fatigue: Proceeding of the Human Factors Society 23ra Annual Meeting.
3. Jaschinski-Kruza W (1990): On the preferred viewing distances to screen and document at VDU workplaces. Ergonomics. 33(8):1055-1063.
4. Tsubota K, Nakamori (1993): Dry Eyes and Video Display Terminal. New England Journal of Medicine. 328(8);584.
5. Keith Rogers (1997): Survey reveals eye suffering among computer users. Las Vegas Revies Journal. November 20.
6. Vo Van Toi and Grounauer PA (1992): Automatic delivery of eye medication by droplet ejection. Investigative Ophthalmology and Visual Science. 33;1012.
7. Nakaishi H (1999): Abnormal tear dynamics and symptoms of eye strain in operators of visual display terminals. Occupational and Environmental Medicine. 56(1):6-9.
8. Mackinnon SE, Novok CB (1994: Clinical commentary: Pathogenesis of Cumulative Trauma Disorder: Journal of Hand Surgery. 19A(5):873-883.
9. Ankrum DR and Nemeth KJ (1995): Posture Comfort and Monitor placement. Ergonomics in Design. 7-9.