

Original Research Article

Ocular symptoms in computers users - A clinical study

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|  | International Archives of Integrated Medicine, Vol. 3, Issue 7, July, 2016. | |
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| | Available online at http://iaimjournal.com/ | |
| | ISSN: 2394-0026 (P) | ISSN: 2394-0034 (O) |
| | Received on: 06-06-2016 | Accepted on: 15-06-2016 |
| | Source of support: Nil | Conflict of interest: None declared. |
| How to cite this article: Garg P, Bundela R, B.B. Lal, Nishant. Ocular symptoms in computers users - A clinical study. IAIM, 2016; 3(7): 1-4. | | |

Abstract

Background: Today computers are main and rapid source of information exchange and have become an indispensable piece of office equipment. As a result the computer users are increasing many folds with every passing year.

Purpose: To assess the magnitude of ocular problems faced by computer users.

Design: An observational study was conducted on people working for at least two hours or more per day on computer.

Materials and methods: Individuals were assessed for their work related symptoms on a preset questionnaire and accordingly were classified into asymptomatic and symptomatic. Symptomatics were further divided into occasional, frequent or everyday symptoms.

Results: Of 913 computer users of age group 16 to 40 years, 65.27% were males and 34.72% were females. 81.48% suffered from ocular symptoms of which 68.01% had occasional symptoms, 19.48% had frequent symptoms and 12.5% had regular symptoms. The symptoms were more pronounced in individuals working >6 hours on a computer.

Conclusion: Ocular symptoms in computer users are directly proportional to the number of work hours on computer. Therefore proper knowledge of working on computers should be given to all as it will increase the work efficiency.

Key words

Ocular symptoms, Computer users, Clinical study, Working hours.

Introduction

Over the last 30 years, there has been an astonishing advancement in electronic technology. Today computers are main and rapid source of information exchange and have become an indispensable piece of office equipment. As a result the computer users are increasing many folds with every passing year.

The human eye is at constant work while operating on a computer. Computer images are made up of tiny dots, known as pixels. Our eyes need to focus them to see the images sharp. As a result eyes keep on refocusing. Nowadays, though we view improvised Visual display terminal (VDT) monitors and liquid crystal display (LCD) screens, they are also not totally friendly to the human visual system. When we work on computers, our eyes constantly shift and focus between the screen, document and keyboard about 25,000 times in a day's work. The eyes have to accommodate, converge and adapt to these tasks under the varied light conditions of the surrounding environment and the VDT. All this leads to multitude of both ocular and somatic problems. So to observe and analyze the visual problems faced by computers users the present study was undertaken.

Materials and methods

A prospective observational study was conducted on the students and teachers of computer Institutes viz. NIIT; students and teachers of IET Engineering college. Patients who came to ELMC OPD, and computer operators of ELMC. The subjects who were working for at least two or more hours per day on computer were considered. Their environment was also analyzed with emphasis on type and size of the screen, distance of the screen from the worker and illumination of the room. Subjects working under acceptable working environment were considered, i.e., subjects using 14" or more size of the colour monitor, the viewing distance between 20 to 30 inches, the level of computer screen below the eye level, no glare on computer screen and roof suspended lighting being used.

All subjects were working in air conditioned rooms and antiglare screen was not being used.

The subjects were examined to rule out any gross ocular pathology like uncorrected refractive error, pathological myopia, squint, convergence insufficiency, and any anterior segment or posterior segment disease. Subjects having any gross ocular pathology were excluded from the study. Subjects were assessed for symptoms due to working on computers. The persons included in the study were classified into two groups: Symptomatic and Asymptomatic. Then the symptomatic patients were further divided into three groups according to the frequency of symptoms whether present occasionally, frequently or every day. The data obtained were compiled and analyzed.

Results

This study was done on 913 subjects of the age group 16 to 40 years. Out of them 596 (65.27%) were males and 317 (34.72%) were females with a ratio of 1.8:1. Of the total subjects, 81.48% were symptomatic; out of which 68.01% were presenting with occasional symptoms, 19.48% were frequently symptomatic, while 12.5% patients were having symptoms every day. A direct correlation was seen between working hours on computers and occurrence of ocular symptoms. Out of 572 (62.65%) subjects working for two to four hours per day on computers, 455 (79.54%) were symptomatic, while out of those subjects (10.18%) who were working for more than six hours per day, 83 (89.24%) were symptomatic. There was no significant difference in the frequency of symptoms between the two sexes. There were multitude of symptoms. The most common symptoms were eyestrain (59.8%), tired eyes (39.53%), watering (42.05%), sore eyes (40.85%), headache (50.93%), and head, neck and back pain (48.95%). The symptoms were present either singularly or in combination. The prevalence and the frequency of every symptom were increasing with increment in the number of

working hours per day and it was found to be statistically significant.

Discussion

In this study the percentage of subjects having symptoms (81.48%) corresponds to the previously done studies by Cakir A (1978) [1] (85%) and Keith Rogers (1997) [2] (86%). There can be many probable reasons for this like- the human vision is not suited for staring at a computer screen. Computer images are made up of tiny dots, known as “pixels” and since our eyes cannot focus on them, we must constantly refocus to keep the images sharp. Eventually we get repetitive stress of the eye muscles. This leads to the common problem of eyestrain and tired eyes as has been found by Tsubota (1993) [3] in his study. Dry eyes have a profound association with symptoms of asthenopia (Nakaishi H 1999) [4]. Dry eyes can be caused by infrequent blinking. Computer use may cause a dramatic decrease of the blink rate and the blink rate is highly correlated to visual fatigue (Vo van Toi and Grounauer PA, 1992) [5]. This decreased blink rate causes dryness of cornea and eventually reflex tearing. Both dryness of cornea and excessive work on extra ocular muscles causes sore eyes seen in 40.85% subjects; burning eyes reported in 38.77% subjects; and red eyes seen in 26.72% subjects. Slowness in changing focus (28.03%) is caused by the repetitive stress on the eye muscles. Keith Rogers (1997) [2] also reported this symptom among computer users.

Poor image quality due to lack of contrast, too bright or too dim screen, flickering of the screen image, inadequate screen resolution or clarity may also lead to visual fatigue. And all this leads to the problem of light sensitivity (37.02%). Bauer and Cavonius (1980) [6] found a lower error rate with dark letters on a white background. As the working hours increases, more and more subjects become symptomatic; and the severity of symptoms in terms of symptoms felt everyday and frequently is also increasing. As expected the findings correspond

to the study done by Tsubota (1993) [3] who showed that visual fatigue is directly related to the work required by extra ocular muscles. As the working hours increase more work is demanded from the muscles. Keith Rogers (1997) [2] in his survey had found that the subjects who were working for more than two hours per day on computers had ocular symptoms. Periodic blurring of distant vision (24.75%) was caused due to constant focusing on the screen which is at near distance. This causes spasm of muscles for near vision and result in difficulty in focusing the distant objects. While strain on the eye muscles due to prolonged operation on computers causes Periodic blurring of near vision (22.34%), this may also lead to double vision (7.99%).

Apart from ocular symptoms, people also complain of associated symptoms like headache (50.93%) and neck, shoulder and back pain (48.95%). Both these symptoms are very common and has been reported by many investigators viz. Ostberg (1975) [7], Smith (1979) [8], Keith Roger (1997) [2], Mc Kinnen (1994) [9] and Ankrum and Nemeth (2000) [10]. Headache is caused by the stress over the eye muscles during the computer work and postural discomfort caused by prolonged sitting while working on computer and having very few visually acceptable options for postural movements. Neck, shoulder and back pain are also caused by prolonged sitting posture with little options for head and neck movements which becomes tiring with time. Ankrum and Nemeth (1995) [11] reported that lower monitor placement could increase the acceptable option that users have for neck movement.

Conclusion

As we have observed that ocular symptoms in computer users are directly proportional to number of work hours on computers, therefore people should be given proper guidance about importance and ways for in between relaxations during long hours of work on computer monitor.

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