

## Computer Vision Syndrome (CVS): Recognition and Control in Software Professionals

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**ABSTRACT** Musculoskeletal Disorders among video display terminal (VDT) users have become a worldwide problem. Computer Vision Syndrome holds the distinction of being called the number one occupational hazard of the 21st century. Prevention of injury and illness is, obviously, the best approach, but comprehensive health care and safety programs can help to reduce corporate sector's workplace injuries, absenteeism or presenteeism and related expenses. A fitness program was designed to reduce the symptoms of CVS in software professionals. A pre and post-test study was conducted to evaluate the effect of the fitness program. The study revealed that the fitness program helped to reduce the symptoms of CVS in software professionals.

### INTRODUCTION

Computer Vision Syndrome (CVS) is the number one occupational hazard of the 21st century. CVS symptoms may effect as many as 70 percent of all computer users. Visual effort is greater when looking at the computer screen as compared to that when looking at a paper. This can be attributed to the fact that blinking of eyes is 22 times per minute when looking at a paper which reduces to 7 blinks per minute while looking at a computer screen. This leads to dry eyes. Thus when using a computer, the eyes strain as they attempt to maintain focus, or may be incapable of obtaining focus at all.

CVS is marked by eyestrain, tired and burning eyes, headaches, blurred vision, neck and back pain and muscle spasms. Computer work has not yet proven to cause permanent damage to eyes, but temporary discomfort that may occur can reduce productivity. It can cause lost work time and reduce job satisfaction. The performance on a specific task can be significantly decreased due to CVS, as much as 40 percent. This includes a reduction in work accuracy and a decrease in task volume.

### Literature Reviewed

Working at a computer is more visually demanding than doing other standard office work such as reading printed documents. Aspects of the design of the computer video display such

as screen resolution and contrast, image refresh rates and flicker and screen glare, as well as working distances and angles all may contribute to worker symptoms (Campbell and Durden 1983).

Employees using VDUs a large part of their working days frequently report their eyesight is quite badly affected at work and for some time afterwards. Daum (2002) strongly suggests that improving the visual status of workers using computers results in greater productivity in the workplace, as well as improved visual comfort. The visual symptoms can largely be resolved with proper management of the environment and by providing proper visual care for the employees (Sheddy 1992).

The symptoms of CVS-headaches and eyestrain- can force employees to shut down. Even the symptoms are negligible; they can affect performance and productivity in a big way. Companies can choose to understand and address the hazards of computer use. The gain can be extremely significant, both for employer and the employees (Torrey 2004). Operating a VDT may lead to visual, muscular or mental fatigue. Some people need corrective lenses to avoid eye strain and headaches. Studies show that 50%-90% of computer users experience the symptoms of CVS ([www.myeyeworld.com](http://www.myeyeworld.com)).

### METHODOLOGY

**Study Location:** A need assessment survey was conducted in software companies in Jaipur

city, Rajasthan, India. The fitness program was implemented in selected software development companies.

**Selection of Study Population:** The study population was computer professionals working on software development. Sixty male subjects (30 in the control group, and 30 in the experimental group) were chosen in the age group of 25–35 years, having at least one-year experience in a similar kind of work.

**Tool Development:** A questionnaire was developed to collect data about perceived symptoms of CVS.

**Designing of the On-the-Job Fitness Program:** A set of exercises for eyes that could be performed on-the-job was designed. Each exercise was of about 10–20 seconds duration.

**Implementation of the On-the-Job Fitness Program:** The experimental group of 30 subjects was exposed to the fitness program while the control group was not offered training.

## RESULTS

**Perceived CVS Symptoms:** It is evident from Table 1 that majority (90%) of the respondents reported severe pain in the head and eye region. 10% respondents reported moderate pain in eyes and head region. None of the respondents was totally free from any feeling of discomfort in eyes. The eyes are exposed for prolonged periods to the atmospheric air directly while working on a VDT which leads to increased evaporation and symptoms arise as dry eyes.

**Table 1: Percentage distribution of respondents on symptoms of computer vision syndrome**

Range	No. of respondents	Severity level
0-10	nil	No pain
11-20	nil	Very mild
21-30	nil	Mild
31-40	10	Moderate
Above 40	90	Severe

This can be attributed to the fact that when looking at the computer, the eyelids are in a static straight position and blinking reduces to 7 per minute from 22 per minute in a normal condition.

Looking at a computer typically means looking straight ahead hence more of our eye surface is exposed, and the tear film can evaporate causing a dry, burning and gritty sensation (Torrey 2004).

**Impact of Fitness Program:** Musculoskeletal problems are closely connected to the visual

demands of computer tasks. Visual symptoms occur because as we approach age 40 the ability of our eyes to focus on closer objects decreases as the eyes' lenses become less and less flexible. Thus when using a computer, the eyes strain as they attempt to maintain focus, or may be incapable of obtaining focus at all. It has been acknowledged that vision can have a powerful influence on computer users' posture and comfort.

The statistical summary in Table 2 reveals that the mean for the symptoms of CVS decreased from 45.1 in the pre test to 25.4 in the post test. The C.V. on the other hand increased from 11.30% to 14.17%.

**Table 2: Statistical summary of symptoms of CVS**

	Range	Mean	S.E.	S.D.	C.V.%
PrT	34-54	45.1	0.94	5.1	11.30
PT <sub>exp</sub>	21-35	25.4	0.66	3.6	14.17

The  $t$  value (19.01) in Table 3 reveals that there was a significant difference between the symptoms of CVS in the pre test and post test of the experimental group. The  $t$  value i.e. (18.78) of post test in the experimental and control group also suggest a considerable difference in the CVS symptoms. Musculoskeletal problems are closely connected to the visual demands of computer tasks. It is mentioned in [www.worksupport.com](http://www.worksupport.com), employees should be provided training on exercises that can be combined into a brief five-minute routine. The exercise should stretch the muscle groups in various regions of the body. Proper exercises are a complement to a complete office ergonomics problem. The approach should be individualized to the worker needs.

**Table 3: Paired t test before and after training for symptoms of CVS**

	Mean difference	$t_{cal}$
PrT <sub>exp</sub> vs PT <sub>exp</sub>	19.7	19.01**
PT <sub>exp</sub> vs PT <sub>con</sub>	18.7	18.78**

\*\*Significant at 1%

In order to streamline the computer work process, the design of the visual task environment and the vision of the person need to be optimized. If there is a problem with the person's vision, then they will not be able to perform their job as well as they should.

Due to the impact of CVS on worker's comfort and productivity, the American Optometric

Association believes that more attention needs to be given to reducing the impact of computer related vision problems in the workplace and to providing appropriate eye and vision care for workers who use computers on a regular basis ([www.aoa.org](http://www.aoa.org)).

If the process efficiency of a VDT user is to be improved, it is important that the worker has good vision. It is beneficial to exercise the eyes by periodically focusing on objects at varying distances. This is the best control to avoid visual fatigue. Practicing blinking regularly can be good for visual health. The visual symptoms can largely be resolved with proper management of the environment and by providing proper visual care for the employee.

Besides the comfort of the user, proper makes economic sense too. Visual problems lead to 4-8% slower performance on occupational tasks (Harris and Shetty 1992).

Prolonged viewing of the monitor at close distance leads to fatigue of convergence and its weakness/insufficiency. This consequently leads to eye strain, pain and headache. It is thus important to address the problem and sort out the solutions for it.

The study revealed that frequent breaks while working on a VDT can help to reduce symptoms of CVS in software professionals. This can lead to a better general well being of an individual and

can prove to be beneficial in increasing productivity of the workers. The approach expands the value of programs to improve health and reduce lifestyle risks to health by quantifying their combined effect on medical costs, absences, work performance and turnover.

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