

Health Hazards of Computer users & Remedies (Computer Ergonomics)

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Abstract—Computer users, especially those who continuously operate computers for hours together, are usually prone to certain health problems which are called ‘Musculo-Skeletal Disorders’ and ‘Computer Vision Syndrome. These problems can be prevented to a large extent if users know a little about ‘Ergonomics’ of the computer. This article briefly describes computer-related-disorders and ergonomic tips for computer users.

Index Terms—Computer ergonomics, computer-related disorders, Health Hazards

I. INTRODUCTION

Computers have become an integral part of life. Newer studies show that if you don't use the computer properly when working on a computer, you chance discomfort, pain and even injury. New research shows that it takes more than just an ergonomic desk chair or a split keyboard to prevent health problems affecting millions of computer users. The repetitive motion is one factor among many that contribute to a cluster of symptoms called "computer-related disorder" (CRD).

A. Cumulative trauma disorder (CTD), and Repetitive stress injury (RSI)

Work-related musculoskeletal system disorders (WMSDs) are as follows.

1. Carpal tunnel syndrome
2. Back pain
3. Osteoarthritis
4. Tendinitis
5. Teno-synovitis
6. "Pitcher", "Golfer" or "Tennis Elbow"

A. Computer Electromagnetic Radiation and Its Health Effects

B. Computer Vision Syndrome

Some visual display users have reported sore and tired eyes, blurred vision and eye fatigue after prolonged use of their terminals. It is natural for

some people to experience visual discomfort if they've been using their eyes intensively over a long period of time, whether it is working at a display, studying for an exam or doing close work. While eye fatigue may be uncomfortable, it is not damaging to the eye. It also is a temporary condition and goes away with rest.

Most common work related Muscular skeletal disorder is carpal Tunnel Syndrome which is described below.

CARPAL TUNNEL SYNDROME

The carpal tunnel receives its name from the 8 bones in the wrist, called carpals that form a tunnel-like structure. The tunnel is filled with flexor tendons which control finger movement. It also provides a pathway for the MEDIAN NERVE to reach sensory cells in the hand. Repetitive flexing and extension of the wrist may cause a thickening of the protective sheaths which surround each of the tendons. The swollen tendon sheaths, or Teno-synovitis, apply increased pressure on the median nerve and produce Carpal Tunnel Syndrome MOTOR-Thenar muscle at the base of the thumb atrophies and strength is lost.

SENSORY- Subjective or objective hypoesthesia (decreased sensation) coinciding with median nerve distributions, heat and cold sensation lost.

II. HELPFUL HINTS FOR WORK AREA

Millions of people work with computers every day. There is no single "correct" posture or arrangement of components that will fit everyone. However, there are basic design goals to consider when setting up a computer workstation or performing computer-related tasks.

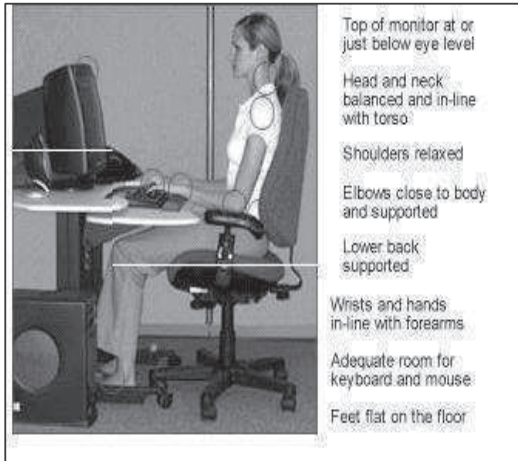
Creating the Ideal Computer Workstation

It is necessary to plan to create an ergonomically sound workstation for computer users. The plan should include illustrated guidelines on how to adjust furniture, computer equipment, and work aids. It must also include information on how to organize work area and tasks, and checklists to

evaluate the ergonomics of current workstation. It has to help in preparing specifications list when purchasing new equipment.

The Work Area

The following figures illustrate how a computer user should adjust his body posture and eye alignment while using a computer.



Monitors



Display screen is too high



Comfortable viewing angle

Monitors

Stresses because of bifocal lenses
Bifocal users typically view the monitor through the bottom portion of their lenses.

This causes them to tilt the head backward to see a monitor that may otherwise be appropriately placed. As with a monitor that is too high, this can fatigue muscles that support the head.



Lower the monitor (below recommendations for non-bifocal users) so you can maintain appropriate neck postures. You may need to tilt the monitor screen up toward you.

Raise the chair height until you can view the monitor without tilting your head back. You may have to raise the keyboard and use a foot rest.

Use a pair of single-vision lenses with a focal length designed for computer work. This will eliminate the need to look through the bottom portion of the lens.

Monitors



Put monitor directly in front of you and at least 20 inches away
Place monitor so that top line of screen is at or below eye level
Place monitor perpendicular to window

Following are some hints on how to minimize fatigue and other harmful effects while using computer.

- Eyes should rest periodically by focusing on objects that are farther away (for example, a clock on a wall 20 feet away). The user should look away, and blink at regular intervals to moisten the eyes.
- The user has to alternate duties with other non-computer tasks such as filing, phone work, or customer interaction to provide periods of rest for the eyes.
- There may be some factors that reduce image quality, make viewing more difficult and may lead to eye strain by other electrical equipment located near computer workstations. The result may be display quality distortions and dust accumulation, which are accelerated by magnetic fields associated with computer

monitors. These may reduce contrast and degrade viewing conditions.

- Computer workstations should be isolated from other equipment that may have electrostatic potentials in excess of +/- 500 volts.
- Computer monitors should be periodically cleaned and dusted.

Additional hints are given below for using related equipment with minimum discomfort.

Keyboards



- The keyboard should be directly in front of the user.
- The user's shoulders should be relaxed and your elbows close to your body.
- The wrists should be straight and in-line with your forearms
- Chair height and work surface height should be adjusted to maintain a neutral body posture.
- Elbows should be about the same height as the keyboard and should hang comfortably to the side of the body. Shoulders should be relaxed, and wrists should not bend up or down or to either side during keyboard use.
- Central pencil drawers should be removed from traditional desks if chair can not be raised high enough because of contact between the drawer and the top of the thighs. The work surface should generally be not more than 2 inches thick.

Pointer/Mouse



- The pointer/mouse should be kept close to the keyboard.
- Both hands should be used alternately while operating the pointer/mouse.
- Keyboard short cuts are to be used to reduce strain.

Wrist/Palm Supports

- Wrist rest should be used to maintain straight wrist postures and to minimize contact stress during typing and mousing tasks.

Document Holders

Documents should be at the same height and distance as the monitor.

Chairs

Desirable specifications of computer chairs are:

- Adjustable chair and backrest
- Natural S-curve of the spine
- Seat pan with a rounded, "waterfall" edge.

Shoulders in various positions are illustrated below.



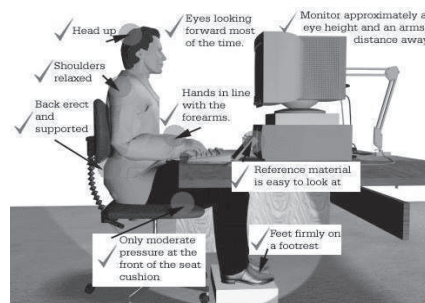
Some other precautions are as follows:

- Taking micro breaks or rest pauses
- Adjusting to have optimum lighting
- Avoiding Glare Effect on monitor

III. ERGONOMIC TIPS FOR COMPUTER USERS

Ergonomics is "Study of how people physically interact with their work, fitting the job, the equipment and the work environment to the worker".

Ideal Office



- Head Up
- Shoulders relaxed
- Back erect and supported
- Eyes looking forward most of the time.
- Hands in line with the forearms.
- Only moderate pressure at the front of the seat cushion
- Reference material is easy to look at.
- Feet firmly on a footrest.
- Monitor approximately at eye height and an arms distance away.

Exercises for the office

One of the biggest injury risk factors is static posture. This can be reduced by

- Spending at least 5 minutes every hour away from your computer.
- *Remembering* to **ONLY** stretch to the point of mild tension.
- Trying to incorporate the stretches into daily routine.

Hand Exercises include

- Doing hand exercises like tight clenching of hand into a fist and releasing it, fanning out the fingers, and repeating it three times.

Back and Shoulder Exercises

These include standing up straight, placing the right hand on the left shoulder and moving head back gently, and repeating it for the right shoulder.



Head and Neck Exercises

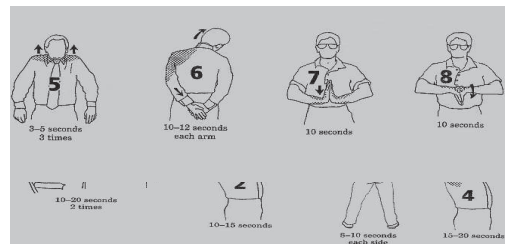
These involve

- Moving head sideways from left to right and back to left.
- Moving head backward and then forward.



Computer and Desk Stretches

Sitting at a computer for long periods often causes neck and shoulder stiffness and occasionally lower back pain. This can be avoided by doing following stretches every hour or so throughout the day or whenever there is a feeling of stiffness. It helps to get up and walk around the office every now and then.



CONCLUSIONS

Many of the potential health problems associated with using computers for long duration can be avoided by following a few precautions and doing appropriate physical exercises. The present article has given an overview of these, and computer users will benefit by making them a part of their work culture.

Note: The information provided in this article is collected from following websites.

www.cdc.gov/NIOSH

www.cdc.gov/

www.osha.gov/

www.ilo.org/

www.defense.gov/