

Computer vision syndrome

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Definition

According to the American Optometry Association, Computer Vision Syndrome (CVS) is the complex of eye and vision problems related to near work which are experienced during or related to computer use. CVS is characterized by visual symptoms which result from interaction with a computer display or its environment. In Most cases, symptoms occur because the visual demands of the task exceed the visual abilities of the individual to comfortably perform the task. If these symptoms occur without significant usage of computer they cannot be termed as CVS.

Introduction

The revolutionary technological advancement has made an impact in almost every aspect of our lives. Our daily tasks, office works, medical facilities, accounting, designing, database management and experimental works have all been greatly facilitated by this rapid pace of development in computer technology. The personal computer (P.C) thus becomes a single device which has made a great revolution in all aspect of our lives. Approximately 100 million people in the world are using computers now. In USA 71% of children work with computer in school. In India about 20 million PCs are in use. In our country the use of computer is increasing day by day. The cost of diagnosis and treatment of CVS in USA alone exceeds 2 billion annually which indicates a reflection of importance to think about this new emerging medical and visual problem.

Pathophysiology

CVS is contributed by several factors:

1. Decreased blinking reflex: Studies have shown that the normal blink rate in human

eyes is 16-20 blinks/min. For persons working on the computer it is decreased to 6-8 blinks/minute. This leads to dry eyes.

2. Prolonged near focusing efforts: Puts strain on ciliary muscles of the eye and leads to a feeling of tiredness in the eyes. This can be a setting for early presbyopia.

3. Repeated head posture change/fixation in a wrong posture: Puts strain on the neck muscles and cervical spine.

Symptoms

Eyestrain (non-specific ocular discomfort), fatigues, headache, blurred near vision, blurred distant vision, dry or irritated eyes, neck pain and/or backaches, diplopia (double vision), difficulty in re-focusing the eyes.

Visual/ocular signs

Accommodative disorders, early presbyopia, binocular vision dysfunctions, refractive errors: hyperopia, astigmatism, myopia, dry eyes, conjunctival congestion (redness).

CVS associated musculo-skeletal disorders, Cumulative Trauma Disorder (CTD) or Repetitive Strain Injury (RSI): Carpal Tunnel Syndrome, bursitis, neck tension syndrome (muscle strain), tendon disorders- De quervain's disease, tenosynovitis- trigger finger.

Environmental factors of computer workstations

Contrast and resolution of the display, viewing distances and angles, adjustability of workstation, room lighting, sustained viewing.

Relationship of CVS to RSI or CTD (Musculoskeletal disorders)

Symptoms are work related and associated with repetitive activity. Problems are related to disorders of muscles, tendons, bones, or nerves. Problems occur or are aggravated by

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repeated movements. A lengthy period of time is required for the problems to develop and for the individual to recover.

Diagnostic tests

Tear film Break-up time (TF-BUT): Examined under slit-lamp with a red free light. Fluorescein dye is used. Normal->10 seconds.

Schirmer Test-1: Special graduated paper strip is used. Normal value- >10mm in 5 minutes.

Rose Bengal Staining: To detect corneal and conjunctival epithelial defect in dry eyes. A positive result is highly significant for CVS.

Management

Proper History

Symptoms, duration, aggravating and relieving factors. Nature of work, computer exposure time. Existing workstation setting, furniture, lighting, etc. Pre-existing ocular or musculoskeletal diseases. Examinations. Refractive status-near, intermediate and distant. Ocular motility, Versions and Vergence. Thorough neuromuscular work-up.

Differential diagnosis

1. Cervical spondylitis
2. Migraine
3. Anxiety Neurosis
4. Dry Eye Syndrome

Investigations

1. X-ray of cervical and lumbo-sacral spine for exclusion of pre-existing spinal disease
2. TF-BUT, Schirmer-1
3. Rose Bengal test

Treatment

A. Counseling regarding

1. Awareness building
2. Work environmental modification

B. Computer eyewear

C. Tear substitute

A. *Counseling*: 10 steps for relieving computer eye strain:

1. Get a computerized eye exam before start using computer. Repeat once a year.

2. Use proper lighting. Eliminate exterior light by closing drapes, shades or blinds. Reduce interior lighting by using lower intensity bulbs and tubes.

3. Minimize glare: To install an anti-glare screen on your monitor. Paint bright white walls a darker color with a matte finish.

4. Upgrade your display. Use LCD monitor instead of a CRT monitor.

5. Adjust the brightness and contrast of your computer screen.

- The brightness of the screen should be the same as the work environment. Contrast between screen background and on- screen characters should be high.

- The text size and color should be optimized for the most comfort.

6. Blink more often.

- Every 20 minutes, blink 10 times by closing your eyes as if falling asleep (very slowly).

7. Exercise your eyes: Follow 20-20-20 rule i.e after every 20 minutes, look at 20 feet distance for 20 seconds.

8. Take frequent breaks- two 15-minute breaks -four additional five-minute "mini-breaks" throughout the work day (6-8 hrs).

9. Modify your workstation.

- Proper posture during computer work. Ergonomic furniture. Position computer screen 20 to 24 inches from your eyes. The center of your screen should be about 10 to 15 degrees below your eyes. Top of the screen tilted back slightly (10-20 degree) away from the operator.

10. Consider computer eyewear and avoid contact lens use during computer work.

B. Computer eyewear

Customized eyeglasses specific for use during work on a computer screen. Anti-reflective coating in the lenses should be used. Presbyopia- Single vision lenses. Intermediate/near bifocals. Special multifocal lenses. Computer Eyewear should also be considered if a person have CVS related symptoms in: Latent hypermetropia, Low astigmatism, Heterophoria, Convergence insufficiency, Disorders of accommodation

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before 40. Person may not require spectacle correction for general vision needs.

C. Tear Substitute

Considered if 1. Symptoms occur/aggravated during computer work. 2. TF-BUT- <10 seconds. 3. Schimer-1- < 10 mm in 5 minutes. 4. Rose Bengal Test- Positive. Commercially available Tear Substitutes- Sodium Carboxymethyl Cellulose. Povidon Solution, Dextran 70 solution 2%, Hydroxypropyl Methyl Cellulose (Hypromellose) 0.5% etc.

Children and computer vision syndrome

The average American child now spends 1 to 3 hours per day on the computer. 90% of school age children have computer access at home or in school. 54 million children in the United States alone use a computer at home or in school. 25% to 30% of computer user children need corrective eyewear. A study in Singapore found that in 3 years the percentage of 7 to 9 years old with myopia had doubled, to 34%.

- Twenty years ago, most children played outside, and their distant vision was more important.
- Today it is a "Near Point World". In Bangladesh also, Specially, in upper middle and upper class, children spend on an average 1-3 hrs in front of a computer/video display terminal.
- Children have a limited degree of self awareness. Children are very adaptable. Obviously the size of the children are smaller than adults.

Five tips for preventing computer vision syndrome in children

1. Before starting school, every child should have a comprehensive eye exam, including near point (computer and reading) and distance testing.
2. Workstations should be arranged to suit a child-not an adult.
3. The recommended distance between the monitor and the eye for children is 18-28 inches.

4. Any behavior that indicates potential problems: Parents and teachers should be aware of eye redness. Frequent rubbing of the eyes. Head turns and other unusual postures, or complaints of blurriness or eye fatigue, avoidance of the computer.

5. Most importantly, have your child's eyes examined by a computer vision specialist.

Conclusion

In this computer era there is no scope to avoid this modern technology rather its use is expanding everyday in the perspective of digital Bangladesh along with global digitalization. If we can make awareness among the computer users regarding its proper uses in respect of optimum amount of work time, proper setup & work positions, related health & eye problems which may occur and some training and tips to the users to solve the common problems can be provided, at least 50% of the computer vision syndrome & closely related problems will be minimized. Rest of the problems which may be more specific & individualized need close co-operation between computer users and expert, trained ophthalmologist so that maximum work can be done with comfort with or without minimum discomfort. Here another point should be kept in the mind of the guardians of the children who are very much habituated to work on a video display terminal for hours together for their any behavioral change, ocular complaints, headache, even visual defects which may be ignored by the children easily for their more adaptiveness. But the parents should be very conscious to identify their problems and should take proper measure by consulting with the computer vision syndrome specialists for the prevention of permanent disabilities.

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