Computer Vision Syndrome (CVS)

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INTRODUCTION

- 20 years revolution computer in workplace
- safety and health VDT users research
- Eye related symptoms the most common
- COMPUTER VISION SYNDROME
- Traetment and diagnostic cost > US$ 2 billion /year

DEFINITION

- The ocular complaints include eyestrain, eye fatigue, burning sensations, irritation, redness, blurred vision, and dry eyes, among others.

 one or more complaints  CVS

- Non-ocular symptoms include headaches, pain in the shoulders, neck, or back.

PATOPHYSIOLOGYCAL cause

Ocular surface mechanisms

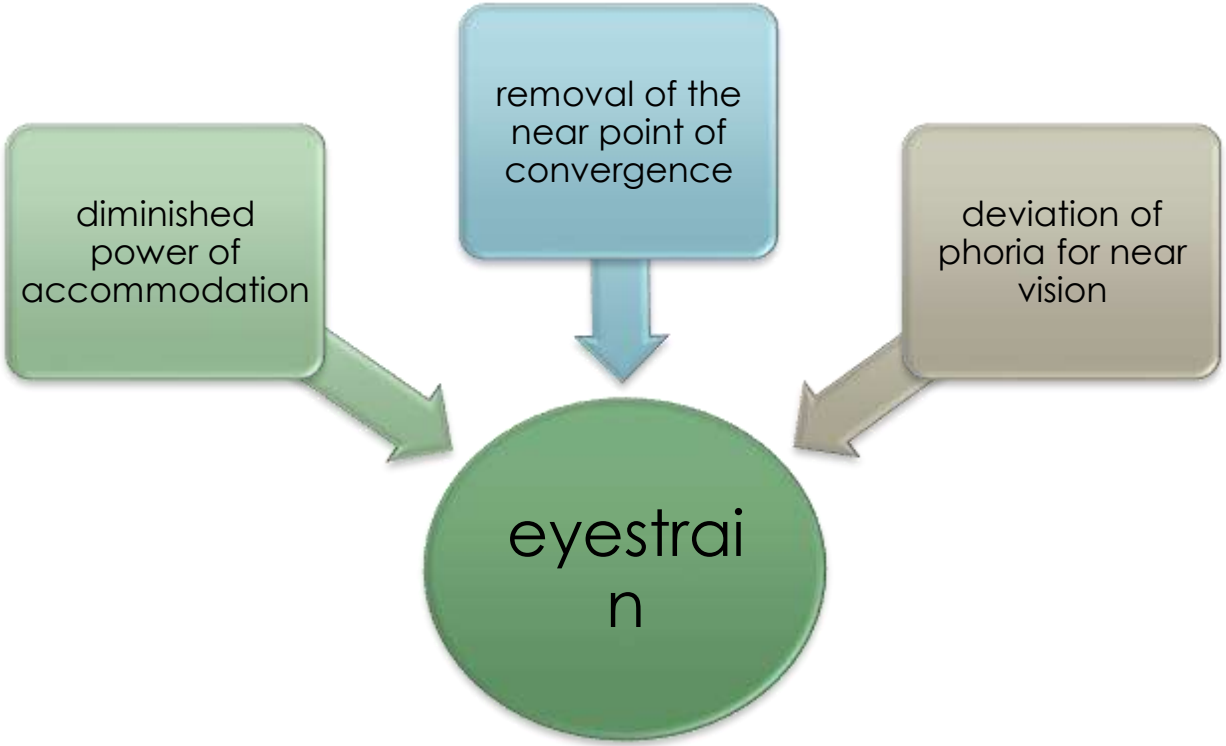
Accomodative mechanisms

Extraocular mechanisms

SYMPTOMATOLOGY

- Asthenopia
- VDT operators working 6–9 hours in front of their screens

ASTHENOPIC symptoms



VDT and transient myopia

- Accommodative effort during near work → myopia progression
- VDT users experienced a myopic shift of about - 0.12 D after the work period
- transient myopic shift appears to occur after VDT use, but its effect to creating permanent myopic change is unknown

OCULAR SURFACE RELATED symptoms

- complaints of eye dryness, burning, grittiness, or heaviness after an extended period of time at the terminal
- the blink rate is decreased and the exposed ocular surface area is increased, causing desiccation of the eye

→ Dry eye

Drying of the ocular surface

Corneal environmental

- Sensitive to drying

Reduced blink rate

- a poor tear film quality, temporary stresses the cornea, meibomian gland disease

Increased Exposure

- wider palpebral fissure

Sex, female

Age

Drying of the ocular surface

- 
  hic Diseases and
  Disease Syndromes
- 
  hic medication
- 
  ct Lens Use
- 
  r condition
- 
  etic

Visual Effects of Display Characteristics – DISPLAY QUALITY

- The images on a VDT consist of thousands of tiny, bright spots (pixels) or horizontal lines (rasters) that collectively form unresolved images that blur together and lack sharp edges.
- create an understimulation of accomodation and a lag of accommodation behind the image on the screen

DISPLAY QUALITY

- extent of visual fatigue correlated with both search reaction times and eye movement parameters
- Research : Sentence Words, spacing, high contrast

LIGHTING AND GLARE

- constant and bright illumination from surrounding sources of light
- because screen reflections are imaged behind the computer monitor initiate inappropriate accommodation responses and affect blink rates
- reduction of reflections and increase of contrast may be obtained from anti-glare filters

REFREASH RATES

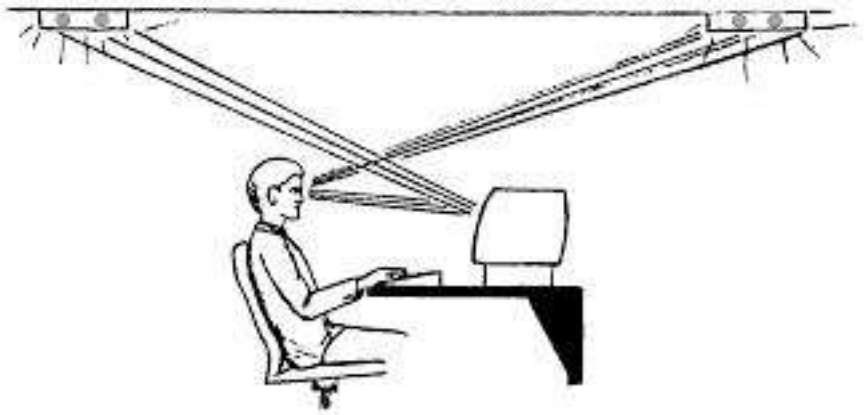
- the number of times per minute (measured in Hz) the screen is repainted to produce an image
- extremely low refresh rates (8 to 14 Hz) could induce epileptogenic seizures
- In most viewing situations this rate is 30 to 50 Hz
- minimum refresh rate on VDT of 75 Hz that minimizes flicker at all brightness levels
- LCD is optimizing worker productivity and minimizing oculomotor effort and eyestrain in electronic reading

RADIATION

- Ionizing radiation cause cellular changes and affect living tissue through the breaking of chemical bonds and the charging of neutral molecules
- soft x-rays by monitor glass screen

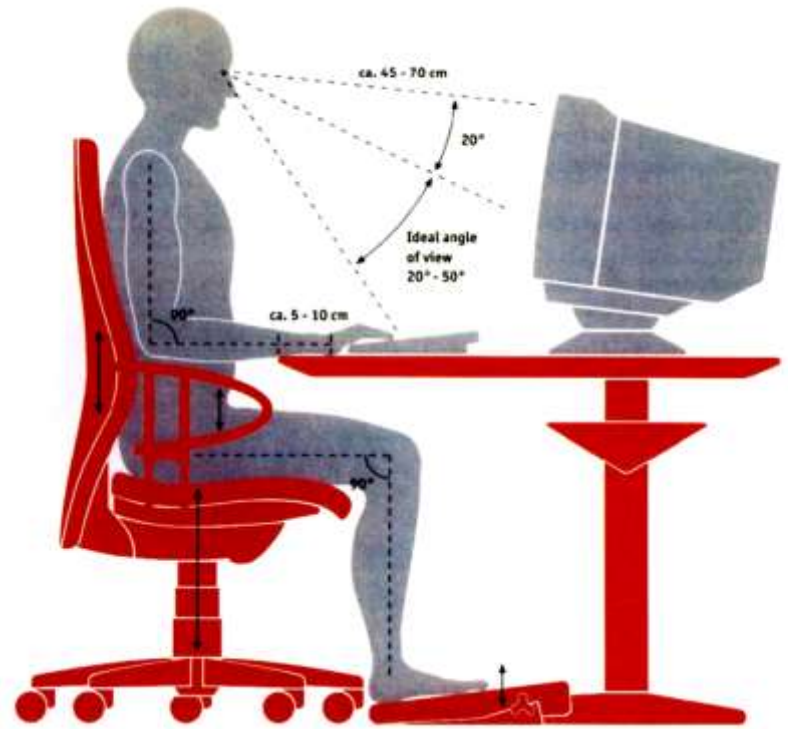
TREATMENT - LIGHTING

- sodium lamps were the most adequate for high functional capacity of the visual analyzer



VDT POSITIONING

- the eye should be 16 to 30 inches from the screen
- the screen should be placed 10 to 20 degrees below (or the middle of the screen 5–6 inches below) eye level



WORK BREAKS

- Work > 4 hours → asthenopia
- frequent breaks are recommended to restore and relax the accommodative system, preventing eyestrain
- looking away at a distant object at least twice an hour during computer usage is sufficient for prevention of visual fatigue
- Taking a quick walk around the office provides stretching of strained and fatigued muscles, a change of scenery, and possible relaxation

PAGE BREAK

LUBRICATING DROPS

- to relieve the symptoms of dry eyes due to decreased blink rates
- higher viscosity eye drops may be more beneficial than balanced salt solutions

→ normalized the interblink interval and relieved ocular discomfort more efficiently

COMPUTER EYE GLASSES

- Conventional bifocals are designed for viewing at 16 inches at an angle of 20 degrees or more below primary gaze
- Occupational progressive lenses are incorporate a large area in the top half of the lens for mid-distance viewing (i.e., VDT) and a bottom half of the lens for near distance (i.e., keyboard, desktop)

COMPUTER EYE GLASSES

- microenvironment glasses (MEGS) increase humidity around the eye will alter the tear film dynamics, by increasing the aqueous layer and decrease evaporation due to the increased humidity

DRY EYE SYNDROME (DES)

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INTRODUCTION

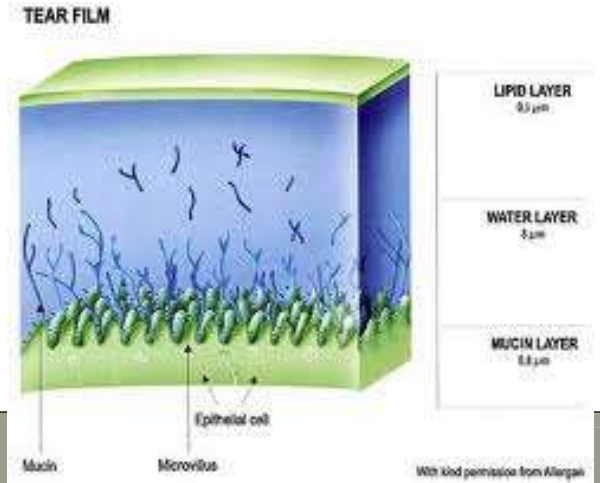
- a disorder of the tear film which occurs due to tear deficiency or excessive tear evaporation; it causes damage to the interpalpebral ocular surface and is associated with a variety of symptoms reflecting ocular discomfort
- keratoconjunctivitis sicca (KCS)
- Increase infection and complication during operation procedures

EPIDEMIOLOGY

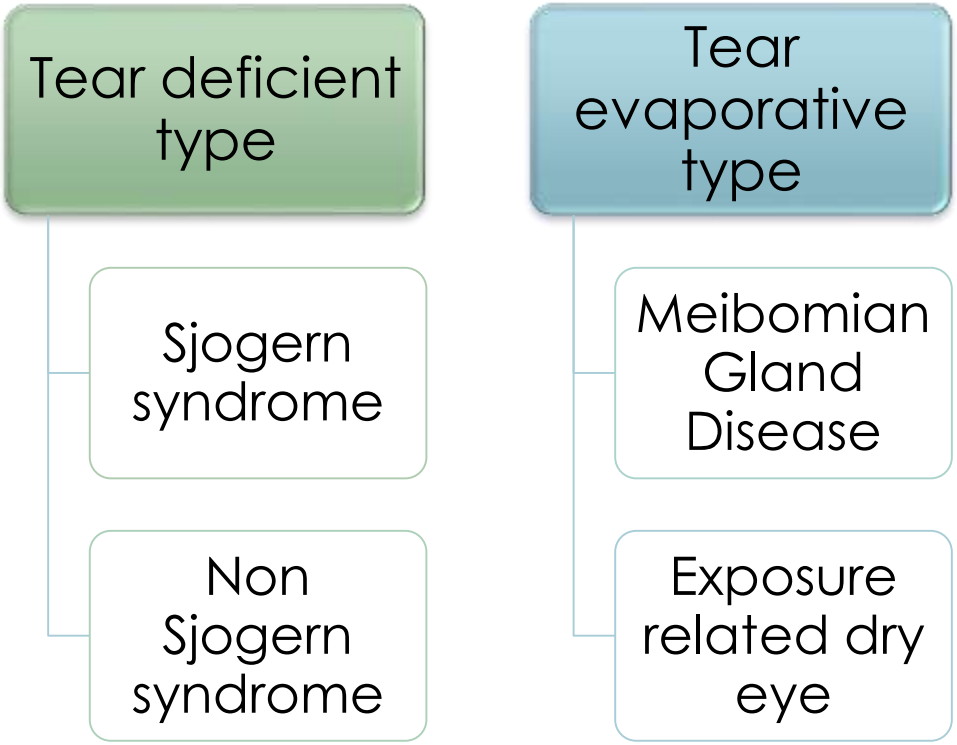
- 1 out of 7 individuals aged 65 to 84 years reports symptoms of dry eye often or all of the time
- Prevalence >> women
- Onset increase at 45 yo due to menopouse

CLINICAL TYPES

- tear film lubricates the eye, maintains nutrition and oxygenation of ocular structures, acts as a refractive component and helps remove debris from the ocular surface.
- Contains anterior lipid layer, a middle aqueous layer and an innermost mucin layer



CLINICAL TYPES



ETIOLOGY

PRIMER

SEKUNDER

- inflammatory disease
- environmental
- Hormonal imbalance
- Contact lens wear
- Neurotrophic deficiency
- Eye surgery medication

PATHOGENESIS

- Decrease lactoferin and EGF
- Increase AQP-5 protein in acinar cell lacrimar gland → protein leakage and lymphocyte infiltration
- Increase cytokine pro inflammation in conjunctival epithelial (IL 1, IL 6)
- Glycoprotein imbalance in tear film → increase sialic acid

CLINICAL SYMPTOMS

- ocular burning
- foreign body sensation
- stinging sensation
- pain
- Photophobia
- blurred vision

WORKUP

Careful history

- DM, thyroid, connective tissue disorder, contact lens wear
- Previous ocular procedures → laser refractive surgery
- Drug history

Careful ocular examination

- Slit lamp biomicroscopy → blepharitis? Symblepharon?
- Staining conjunctiva and cornea

DIAGNOSTIC CRITERIA

Ohashi et aL

a combination of

(1) dry eye symptoms,

(2) suggestive findings on Schirmer (< 5 mm wetting after 5 minutes) and fluorescein clearance tests

(3) fluorescein and Rose Bengal staining (> 3+)

would verify clinical dry eye.

DIAGNOSTIC CRITERIA - TEST

fluorescein tear break-up time test (TBUT)

- → Tear film stability
- → interval in seconds between a complete blink and the first appearance of a dry spot or discontinuity in the precorneal film
- → less than 3 seconds are classified with clinical dry eye

DIAGNOSTIC CRITERIA - TEST

Ocular surface dye staining (Fluorescein and Rose Bengal stains)

→ epithelial barrier is disrupted (Fluorescein)

→ devitalized epithelial cells on the conjunctiva (Rose Bengal)

Schirmer test (aqueous tear production)

(a) without topical anesthesia (Schirmer test I) which evaluates the ability of the ocular surface to respond to surface stimulation → <10 mm

(b) under topical anesthesia (Schirmer test II) which evaluates basal tear secretion → < 5 mm

MANAGEMENT

- Artificial tears →to replenish the deficient aqueous layer of the tear film and to dilute inflammatory cytokines
- Topical steroids or non-steroidal anti-inflammatory → Sjogern syndrome associate inflammation
- Topical antibiotics → corneal complication
- Eyelid hygiene and warm lid compresses → Meibomian gland disease

MANAGEMENT

- Topical immunomodulating agents → Cyclosporine A → reduced T cell infiltration and cytokine
- Autologous serum topical → severe DES, for GF
- Bandage contact lens, rigid scleral contact lens → exposure keratopathy
- Punctal lacrimal occlusion → corneal complication
- Operatif → amniotic membrane transplantation, tarsorrhaphy, keratoplasty, limbal stem cell transplantation, or even ocular prostheses

THANK YOU FOR YOUR ATTENTION