

## 6. EYE CARE & PRECAUTION WHILE WORKING INFRONT OF COMPUTERS

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### INTRODUCTION

Eye is considered to be the most important and noblest sense organ of human body.

In today's era of 21<sup>st</sup> century, the full computerization of a country is necessary for the progress.

Like "Stone Age" today era can be defined as "Computer Age".

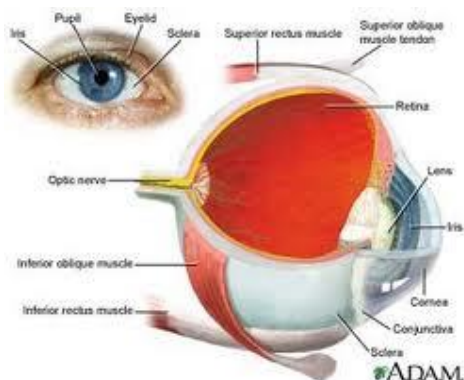
It has seems that the work at computer is very intensive & most tiring therefore countries like Germany has included computer operational work in the list of the 40 most harmful trades for the health & restricted work at the computer should not exceed 50% of the working time.

Other developing countries are also following the suit. In the developing countries like India where the remuneration for the work are far from satisfactory & the young generation is aspiring for more material gains which necessitate them to work over time or have part time jobs in addition to their legitimate work.

This situation adds up to the works with the computer which badly affects their health



### Eye anatomy



### Which are visual display terminals?

Long-term use of computer monitor exposes the people for bright light which is not complacent with human eye. Hence such long term & repetitive exposure can damages eyes.

This damage is called as Computer Vision Syndrome in modern terminology. These ophthalmic health problems have been extensively investigated by American optometric association of 32 thousand ophthalmologists and opticians which concluded that working at the computer is unnatural for human eyesight & 70-75% of all users who work with the computers have problems with the eyesight. Lot of complaints



received from the computer operators about sharp pain in the eyes, blurring of vision and problems about convergence as constant gazing at the monitor leaves hardly any scope for blinking causing stress on eye.

While reading a text from a paper the human eye takes the reflected image on which the light falls, where as reading the text on the computer screen one has to look at the bright source of light. While operating computer, one has to do both things simultaneously. This results into stress on eyes, as the eye has to adjust with light from paper & bright light of monitor simultaneously for thousand times a day. This has a negative influence on the eyesight. In addition to this brightness of illuminated monitor the light emitted by the monitor consists of X-rays, ultra-violet rays and infra-red rays along with the wide range of electromagnetic waves of different frequencies.

In the presence of several computers in a small room, ion quantity may increase. Superfluous quantity of positive ions is considered unhealthy for human beings, as these ions affect the circulation of blood & have effect on practically every organ in the body especially vital organs like brain, heart, eyes, kidneys & gonads.

### **WHAT IS COMPUTER VISION SYNDROME?**

The American Optometric Association defines COMPUTER VISION syndrome is caused by extensive use of computers which reduces the blinking rate of a person and due to this water flow across the eyes is reduced drastically and leads to dryness. People in the age group of 18 to 30 years are at the risk of being affected by this syndrome if they spend lot of time on computer.

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.

Vision problems occur frequently among video display terminal (VDT) workers & VDT associated vision problems are more significant than the musculoskeletal disorders

### **PATHOPHYSIOLOGY OF COMPUTER VISION SYNDROME**

CVS is caused by decreased blinking reflex while working long hours focusing on computer screens. The normal blink rate in human eyes is 16–20 per minute. Studies have shown that the blink rate decreases to as low as 6–8 blinks/minute for persons working on the computer screen.

#### **The Effects of VDT**

There is a difference in visual demand when one is viewing the display on the computer screen compare to reading a printed text. An image which is produced on the screen is made up of thousands of tiny spots or pixels which collectively form the image. The margin of the image or a word is usually not sharp and this is worsening if the image or word is formed by minimal pixels, or what is known as low resolution. As the resolution goes down the image become poor in quality and the visual demand of a reader has to be increased in order to appreciate well the wording or image. The contrast (intensity of the light) of the word to the background, the glare of the computer screen and the reflection from the glass screen are all important factors determining the amount of visual demand one must put in order to perceive the image well.

The complex of eye and vision problems related to near work experienced during computer use has been termed "computer vision syndrome".

#### **Eye and Vision Related Complaints**

Studies have found that the majority of VDT workers experience some eye or vision symptoms. However, it is unclear whether these problems occur to a greater extent in VDT workers than in workers in other highly visually demanding occupations

Work that is visually and physically fatiguing may result in lowered productivity, increased error rate and reduced job satisfaction. Therefore, steps should be taken to reduce the potential for development of stress and related ocular and physical discomfort in the workplace.

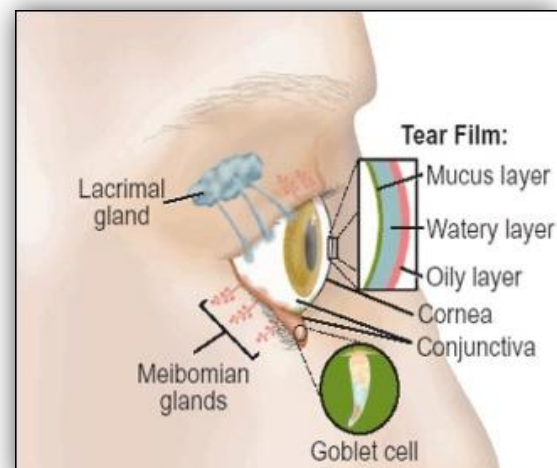
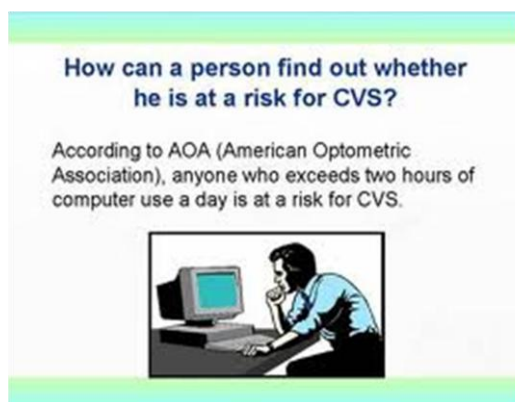
### Visual Demands of VDT Work

Viewing a video display terminal screen is different than viewing a typewritten or printed page. Often the letters on a VDT screen are not as precise or sharply defined, the level of contrast of the letters to the background is reduced and the presence of glare and reflections on the screen may make viewing

more difficult. Viewing distances and angles used for VDT work are also often different from those commonly used for other reading or writing tasks.

Some VDT workers may experience problems with eye focusing or eye coordination that cannot be adequately corrected with eyeglasses or contact lenses. A preventive approach to reducing visual stress from VDT work incorporates the use of rest or alternate task breaks throughout the workday. Many VDT tasks are repetitive and can become stressful both mentally and physically after an extended period of continuous work.

### Who is at risk for CVS



### Who is at risk for CVS Tears

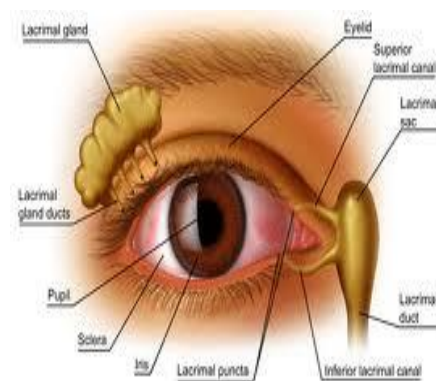
**Tears** are the liquid product of which clean and lubricate the [eyes](#).

#### Physiology :

In humans, the tear film coating the eye, known as the pre corneal film has 3 distinct layers.

#### Drainage of tear film

- ▶ The lacrimal glands secrete lacrimal fluid i.e. tear
- ▶ When the eyes blink, the lacrimal fluid is spread across the surface of the eye.



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### **Other causes**

- ▶ Vitamin – A deficiency (Xerophthalmia), chemical burns
- ▶ Constant staring at a particular object such as T.V., Computer etc.
- ▶ Environment – dry, dusty, windy climate.
- ▶ Medication – antihistamines, birth control pills.
- ▶ Infection – systemic diseases such as lupus, rheumatoid arthritis
- ▶ Long-term use of contact lenses
- ▶ Hormonal changes

### **Signs & Symptoms Of Computer Vision Syndrome**

- ▶ **Signs**
- ▶ Presence of excessive debris & mucus strands in the tear film.
- ▶ Reduced or absence of marginal tear strip.
- ▶ Lusterless ocular surface - xerosis.
- ▶ Lid – Dry & Rough touch.

### **Symptoms**

- ▶ Itching
- ▶ Burning sensation.
- ▶ Blurred vision.
- ▶ Dryness of eyes.
- ▶ Redness of eyes.
- ▶ Pricking Pain.
- ▶ Foreign body Sensation.
- ▶ Difficulty in opening & closing the lids.

### **Diagnosis of dry eye**

We need to consider 3 important parameters that are :

- ▶ Detailed history taking
- ▶ Clinical examination
- ▶ Clinical tests

▶ Many **questionnaires** have been devised by various authors of facilitate relevant history taking in the patients. Schien et al. (1997) prepared a 7-point questionnaire that asks:

- ▶ Feeling dry?
- ▶ Any redness ?
- ▶ Any burning sensation ?
- ▶ Any gritty-sandy sensation?
- ▶ Much crusting on eye lashes?
- ▶ Eye get stuck in the morning
- ▶ Constant ‘awareness’ about the eyes?

### **Detailed history taking**

- ▶ Patient Name
- ▶ Age  
Sex
- ▶ Occupation Working Place
- ▶ Working time Duration
- ▶ Working place whether AC or Fan air flow

### **Clinical examination Slit lamp examination**

#### **Clinical tests**

- ▶ **Schirmers test and TFBUT**

#### **ST strips and Fluroscien strips**

#### **Treatment of Dry Eye**

▶ At present there is no permanent cure , but there are some options available to relieve symptoms.

- ▶ Preservations of existing tears.
- ▶ Reduction of room temperature
- ▶ Humidifiers – e.g. swimmer’s goggles.
- ▶ Punctal occlusion – by solid gelatin rods, silicone plugs, or heat-cautry.

#### **Tear substitutes:**

- ▶ Lack of tears in patients with dry eye is compensated with the use of artificial tears or rewetters.

▶ Retention time, safety and wear-quality of these agents are important clinical considerations.

▶ Essentially, artificial tears are available as drops, gel or ointments

### **Drops**

- ▶ Hypromellose 0.3%
- ▶ Polyvinyl alcohol 1.4%
- ▶ Sodium hyaluronate
- ▶ Sodium chloride
- ▶ Povidone

### **Gels & Ointments**

▶ Viscotears or Gel tears are preferable to drops because they are instilled less frequently.

#### **Ointments**

▶ Petroleum mineral oil is used at bedtime.

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### **Bandage soft contact lenses:**

▶ High hydrated bandage contact lenses occupy unique place in the treatment of dry eye.

#### **Treatment of associated problems:**

▶ It includes treatment of blepharitis, conjunctivitis, corneal ulcer, symblepharon etc.

### **Eye exercise**

AIM :-

- ▶ Rest/relaxation of the mind
- ▶ Rest/relaxation of the eyes
- Rest always improves vision
- Effort always lowers it.

### **Which are they?**

1. Sunning
2. Eye wash
3. Palming
4. Swinging
5. Candle exercise
6. Ball exercise
7. Vapour procedure
8. Cold pad

### **Principle**

1. Relaxation
2. Stimulation
3. Elimination

### **Yoga & Meditation**

### **Treatment According to Ayurveda**

#### **a) Local Treatment:**

▶ Tarpan – Jeevaniya Ghrita, Madhuksiddha Ghrita, Trifala Ghrita, Patoladi Ghrita.

▶ Anjan – Snehanjan etc.

#### **b) Systemic:**

▶ Snehan – Panchatikta, Jeevaniya Ghrita, Madhuksiddha Ghrita.

▶ Swedan – Steam bath.

▶ Ghritapan – Jeevaniya Ghrita, Madhuksiddha Ghrita.

### **PREVENTION OF COMPUTER VISION SYNDROME**

▶ The most important approach in the management of computer vision syndrome is eliminating the causative factor leading to the symptoms

#### **Environmental factor**

Poor lighting & Imbalanced of light between the computer screen and the surrounding.

#### **Computer factor**

Poor resolution



Poor contrast  
Glare of the display

- ▶ **Personal factors (Ergonomics)**
  - ▶ Improper seating posture & viewing distances & angle.
  - ▶ Ocular & Medical diseases
  - ▶ Ageing

### **Workplace Lighting**

One of the most significant environmental factors affecting VDT work is lighting. Survey indicates that many VDT users report problems with general workplace lighting, glare and images reflected on the VDT screen. Many problems related to lighting may be caused by the introduction of VDTs into offices where the lighting was originally designed for traditional desk top work. The lighting is designed on the assumption that workers will perform tasks requiring their lines of sight to be depressed 20° to 40° from the horizontal. In many situations, however, VDTs are placed so that viewing occurs at or even above horizontal eye level.

The brightness of the screen and the surrounding room should be balanced.

Windows are a major source of glare in many offices. VDT operators should avoid facing towards un-shaded window since the difference in brightness between the VDT screen and the area behind it may be extremely stressful and uncomfortable. Operators should also not sit with their back to an un-shaded window since they will cast annoying shadows on their VDT screen.

### **VDT and Workstation Design and Placement**

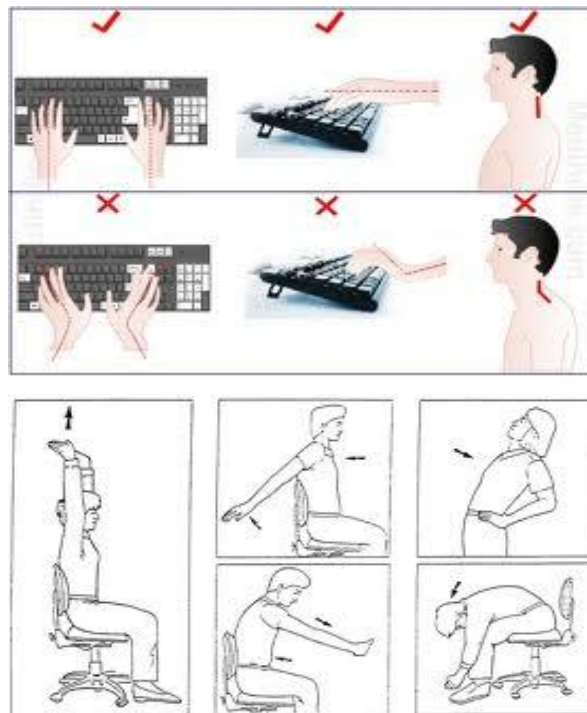
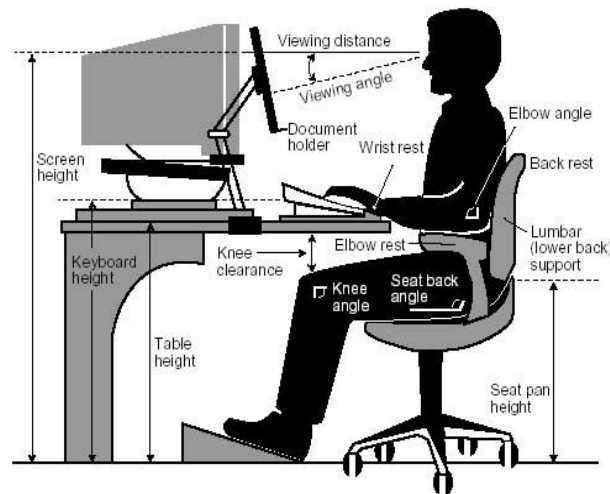
Proper ergonomic design and adjustment of the VDT and the work environment can increase productivity and worker comfort by decreasing the visual demands of the task.

Adjustment of the workstation to meet the individual needs of the operator is also important for overall performance and comfort. Inadequate viewing distances and angles can impose the necessity for awkward postures when viewing a VDT. The appropriate distance from the eyes to the computer screen is determined, in part, by the size of the letters on the screen and the adjustability of the workstation.

A viewing distance of 20 to 28 inches is generally recommended. The top of the screen should be below the horizontal eye level of the operator and tilted back slightly (30°-40°) away from the operator.

Some office environments have been implicated in causing eye irritation because of their dry atmosphere. The airtight environment also traps vapors and particulate matter from office furnishings. This can be a particular problem for contact lens wearers. These problems can be further exacerbated by decreased blinking caused by staring at a VDT.

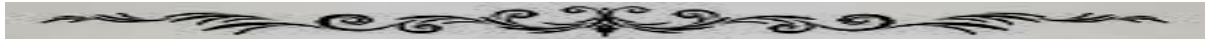
The use of VDTs is associated with a decreased frequency of blinking and an increased rate of tear evaporation, each of which contributes to dry eyes. The exposed ocular surface area can be decreased by placing the VDT at a lower height.



## Ergonomics

The term ergonomics is derived from the Greek word *ergon* [work] and *nomos* [natural laws]. Ergonomics is the science of human biology and engineering as Central Labor institute (CLI). It is applied to industries for improvement of safety, health and performance of their domain, considering physical, psychological, environmental and engineering factors. Improper position & prolonged use of mismatch workstation of visual display terminal (VDT) causes visual and muscular

fatigue amongst operators. The International Ergonomics Association (IEA) defines ergonomics as the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance. Ergonomics is employed to fulfill the two goals of health and productivity.



In this context, a small agronomical intervention is also been considered as effective therapy by providing ergonomically designed workstation along with traditional therapy.

**Do's : For screens :-**Use anti reflector coating **Screen should be tilted 45 °**

**Environment of your work place**

- ▶ Adequate space
- ▶ Good light source
- ▶ Good Aeration
- ▶ AC, Fans air flow not directly on eyes

**Use goggles**

**Use glasses ARC Coating**

**Eye Washing techniques & Contact lenses Care**

- ▶ Twice a day

- ▶ With plain & clean tap water
- ▶ Contact lenses
- ▶ Clean it properly with lens cleaner
- ▶ Remove dust from it
- ▶ Discard the solution per day
- ▶ Lenses should be dipped in the solution

**Diet**

- ▶ Green leafy vegetables
- ▶ Complete diet
- ▶ Diet at proper time
- ▶ Avoid fast food
- ▶ Fruits
- ▶ Citrus food

**Donts:** Avoid smoking, Tobacco chewing, Avoid Tea coffee, void eye rubbing

