

## Assessment of Visual Fatigue Experienced By Female VDT Users

Khushdeep Kaur<sup>a\*</sup>, Harpinder Kaur<sup>b</sup>, M. K Sidhu<sup>c</sup>

<sup>a</sup>Dept. of Family Resource Management, Punjab Agricultural University, Ludhiana, Punjab (India)

<sup>b</sup>Dept of Family Resource Management, Punjab Agricultural University, Ludhiana, Punjab (India)

<sup>c</sup>Dept of Family Resource Management, Punjab Agricultural University, Ludhiana, Punjab (India)

Email Id: harp\_07@rediffmail.com

### Abstract

The last two decades have witnessed a rapidly changing trend towards the application of Video Display Terminal (VDT) technology for information management in the workplaces and homes. Most office workers use computers for at least some of the tasks that they perform, and many use VDTs for the majority of time that they spend at work. Survey on computer workers shows that vision discomfort is most frequent among computer users which may be due to frequent movement of eyes from monitor to the written material to be typed or vice versa. Other involved factors leading to visual fatigue and discomfort may be improper height of screen, poor lighting, and reflection due to screen position or glare. Therefore, a study was conducted on 120 female VDT users working in various banks of Ludhiana City to assess their visual fatigue by taking subjective responses. The results showed that poor vision, sensitivity of eyes and blurred vision were the main visual problems faced by respondents on the five point scale and got I, II and III ranks respectively. The main factors responsible for eye fatigue and strain were found as improper positioning of computer screen, inadequate lighting and glare. So, it was concluded that though the respondents faced many visual problems in relation to workstation design but they did not do anything to improve the design of the workstation which may be due to the lack of awareness at their part. Therefore, some suggestions were given to them in terms of adequate lighting, avoidance of glare and positioning of computer screen to reduce their visual fatigue.

**Key words:** VDT, Visual fatigue, Glare from overhead light source. Blurred vision, Visual problems, Psychological stress

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\*Corresponding Author

### 1. INTRODUCTION

Many VDT jobs do not provide the opportunity to shift one's body position or perform tasks away from the VDT station. Increased psychological stress has also been associated with the use of VDTs. The additional stress may be due to the introduction of new technology and technical procedures, or conditions created by VDT technology, such as monitoring and reducing interpersonal interaction.

The implemented computerized client information system with poorly designed workstation will put the employee at risk of developing visual fatigue. Survey on computer workers shows that vision discomfort is most frequent among computer users which may be due to frequent movement of eyes from monitor to the written material to be typed or vice versa (Snehalatha 2007) . Other involved factors leading to visual fatigue and discomfort may be improper height of screen, poor lighting, and reflection due to screen position or glare. It is important that in discussing the problems of VDT users, good medical management and aggressive problem surveillance programmes needs to be implemented along with appropriate ergonomic interventions. Therefore, visual problems faced by respondents were assessed by taking subjective responses for visual fatigue.

### 2. METHODOLOGY

Field survey was conducted on female employees working on Video Display Terminals (VDT) in different banks of Ludhiana District. Out of four zones of Ludhiana city, two zones were randomly selected. Out of each selected zone, 60 female employees in the age group of 25-35 years working in various private and nationalized banks as VDT users were purposively selected, thus, making a total sample of 120 respondents. A self -structured interview schedule was used to get the subjective responses on visual fatigue and measures taken by them to reduce it. Finally, guidelines were provided to respondents to reduce their visual problems.

### 3. RESULTS AND DISCUSSION

#### Visual fatigue symptoms experienced by respondents

Table 1 shows that respondents felt significant visual fatigue symptoms like tiredness in eyes (89.16%), heaviness (58.33%), frequent headache (51.66%) and itchy eyes (4.72%). Whereas, double vision and glare in eyes were the least felt symptoms as these were felt only by 16.66 per cent and 3.33 per cent of respondents respectively. These results are supported by Sandhu (2001) and Snehalatha (2007) who reported that computer users faced various vision problems like blurred vision, watery eyes, burning and redness of eyes.

Table 1: Visual fatigue symptoms experienced by respondents N=120

Symptoms indicating visual fatigue	Percentage*	Z
Tiredness in eyes	89.16	23.00**
Heaviness	58.33	12.77**
Frequent Headache/migraine	51.66	10.55**
Blinking While concentrating (Slow/ fast/ normal)	38.33	6.11**
Itchy eyes	34.16	4.72**
Double vision	16.66	-1.11 <sup>NS</sup>
Glare in eyes	3.33	-5.55 <sup>NS</sup>

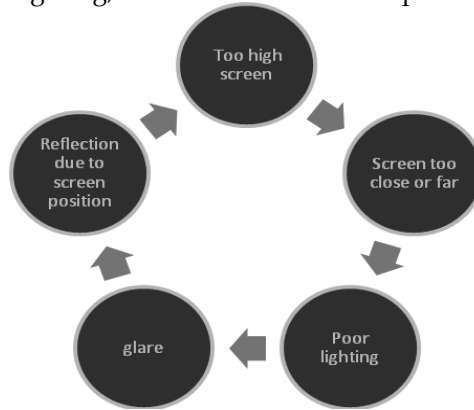
•Multiple responses

NS-Non significant \*significant at 5% level of significance

\*\*significant at 1% level of significance

**Observed responsible factors for eye fatigue and strain**

The main factors responsible for eye fatigue and strain were found as improper positioning of computer screen, inadequate lighting, reflection due to screen position and glare (Fig. 1)



**Fig. 1 Observed responsible factors for eye fatigue and strain.**

**Measures taken by respondents for reducing/treating visual problems**

The respondents were asked about various measures they usually take to reduce/ treat their visual problems and presented in Table 2. Respondents generally consulted doctors and took suggestions from colleagues as remedial measures for reducing their visual problems. Other remedial measures taken by respondents included eye exercises and yoga, taking leave and taking micro breaks during working hours. It was further observed that least adopted measures were self medication and requesting manager for changes at their workstation. It was also observed that respondents hardly made any change at their workstation design for its improvement. Therefore, it was concluded that though the respondents faced many visual problems in relation to workstation design but they did not do anything to improve the design of the workstation which may be due to the lack of awareness at their part. So the need was felt to suggest ergonomic intervention in this regard. **Kogi et al (2005)** also stressed upon low cost improvements in the workstation design that could reduce work related disorders and increase productivity

**Table 2: Measures taken by respondents for reducing/treating musculoskeletal or visual problems N=120**

Measures taken	Mean score*	Mean ranks
Consulting doctor frequently	1.93	I
Take suggestions from colleagues	1.74	II
Eye exercises and yoga	1.51	III
Take leave for rest	1.49	IV
Micro breaks	1.27	V
Self medication	1.18	VI
Request manager for changes in workstation design	1.30	VII
Make adjustments in the workstation design	1.1	VIII

\*Multiple responses

Mean score given on the basis of 3 point scale from Always (2), Sometimes (1) and Never (0).

**Guidelines provided to reduce Visual fatigue experienced by respondents at workstation**

**1) Lighting**

Bright lights shining on the display screen "wash out" images, making it difficult to clearly see your work. Straining to view objects on the screen can lead to eye fatigue.

**Solutions:**

- Place rows of lights parallel to your line of sight (Fig 2).



Fig. 2

- Use blinds or drapes on windows to reduce glare.
- Remove the middle bulbs of 4-bulb fluorescent light fixtures to reduce the brightness of the light to levels more compatible with computer tasks if diffusers or alternative light sources are not available.
- Provide supplemental task/desk lighting to adequately illuminate writing and reading tasks while limiting brightness around monitors.

**2) Glare:** Direct light sources (for example, windows, overhead lights) that cause reflected light to show up on the monitor (Fig 3) make images more difficult to see, resulting in eye strain and fatigue.



Fig. 3

### Glare from overhead light source

#### Solutions:

- Place the face of the display screen at right angles to windows and light sources. Position task lighting so the light does not reflect on the screen
- Clean the monitor frequently. A layer of dust can contribute to glare. (Fig. 4)



Fig. 4

- Use anti glare that attach directly to the surface of the monitor to reduce glare (Fig. 5).



Fig.5

- To limit reflection from walls and work surfaces around the screen, paint them with a medium colored, non-reflective paint. Arrange workstations and lighting to avoid reflected glare on the display screen or surrounding surfaces.
- Tilt down the monitor slightly to prevent it from reflecting overhead light.
- Set the computer monitor for dark characters on a light background; they are less affected by reflections than are light characters on a dark background.

### 3. Monitor

- Placement of monitor for normal users:** A display screen that is too high or low will cause awkward posture head, neck, shoulders, and back. Working in these awkward postures for a prolonged period fatigues the muscles that support the head.

#### Solutions:

- The top of the monitor should be at or slightly below eye level. The centre of the computer monitor should normally be located 15 to 20 degrees below horizontal eye level (Fig. 6).



Fig. 6

- Adequate space for thighs under the desk should be provided feet should be supported.
- Position your computer monitor directly in front of you, so your head, neck and torso face forward when viewing the screen (Fig. 7).

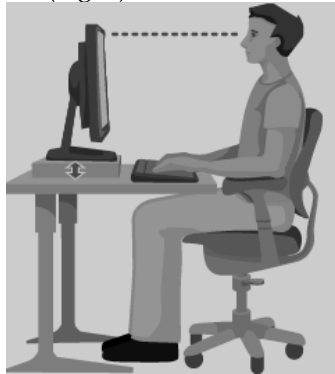


Fig. 7

- If you work primarily from printed material, place the monitor slightly to the side and keep the printed material directly in front. Keep printed materials and monitors as close as possible to each other.
- It's a good option to have Monitor support surface system which allows to modify viewing distances and tilt and rotation angles (Fig. 8).



Fig. 8: Monitor support system

ii) **Placement of monitor for Bifocal users:**-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.

**Solutions:**

- Lower the monitor so you can maintain appropriate neck postures. You may need to tilt the monitor screen up toward you (Fig. 9).



Fig. 9

- 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.

**4. CONCLUSION**

It is concluded that though the respondents faced many visual problems in relation to workstation design but they did not do anything to improve the design of the workstation which may be due to the lack of awareness at their part. Therefore, some suggestions were given to them in terms of adequate lighting, avoidance of glare and positioning of computer screen to reduce their visual fatigue.

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