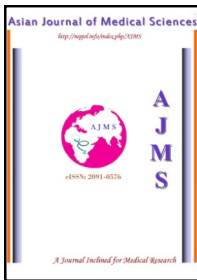


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Assessment of Ergonomical and Occupational Health Related Problems Among VDT Workers of West Bengal, India

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Abstract

Objective: Musculoskeletal disorders are a common problem among computer users. The main aim of the study is to assess the prevalence of musculoskeletal and visual disorders among the VDT workers.

Material & Methods: The study was conducted in the different office premises in Kolkata. After selections of the locations, 100 VDT workers are selected randomly comprising 50 male and 50 female. A detailed study based on a modified Nordic questionnaire was performed among these VDT workers for study period to measure the outcome of epidemiological studies on musculoskeletal disorders.

Results: The main finding of this study was that the Lower back problem is the main problem among VDT workers. The both male and female VDT workers also suffered pain in neck, shoulder, fore arm, wrist, elbow and the different parts of the upper extremities. This study revealed that the female VDT workers suffer more discomfort feeling than male VDT workers. In this study it was clearly indicated that the discomfort feeling was relatively high among the aged VDT workers. Prolonged period of work in an awkward posture mainly lead to discomfort feeling among the VDT workers. Another finding of this study was that both male and female VDT workers suffered from visual stress due to prolonged period of work and without using of antiglare screen in a monitor.

Conclusion: The VDT workers suffered pain mainly in the upper extremities and lower back of the body. They also suffered from visual stress. Females have a higher discomfort feeling than male VDT workers.

Key Words: VDT workers; Discomfort feeling; Visual stress; Gender difference

1. Introduction

Assessment of occupational health problems is one of the common fields of study of ergonomics. Occupational health problems among the VDT workers are one of the important factors nowadays. VDT workers suffer from several types of disorders in their daily life, among them musculoskeletal disorders (MSD) is one of the prime one. Musculoskeletal disorders occur in every kind of occupation and industry. MSD occur gradually over a relatively long period of time of exposure to the corresponding contributing factors.

Musculoskeletal disorders and visual discomfort are prevalent among visual display terminal (VDT) operators.¹

² Carter et al. has reported the association between prolonged computer uses, poor postures at workstations is the main cause of musculoskeletal disorder.³ Gerr et al.

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suggest that prolonged self-reported computer usage is the most consistently reported risk factor for computing related MSDs across study populations.⁴

According to some studies increased use of personal computers has focused our attention on work-related musculoskeletal disorders (WRMSD).⁵⁻⁷ Prevalence of musculoskeletal disorders among keyboards users has also been reported to be as high as 81%.⁷ Prolonged static muscle load, workstation factors have been identified as risk factors for musculoskeletal diseases (MSD).⁸⁻¹⁰

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. Survey on computer workers showed that vision related problems are the most frequent related health problems among computer users.¹¹

The main aim of the study is to assess the prevalence of musculoskeletal and visual disorders among the VDT

workers. This study was also to carry out a gender difference in the consequences of musculoskeletal disorder during different activities in computer work station.

2. Material and Methods

The study was conducted in the different office premises in Kolkata, where VDT works was performed. After selections of the sites, 100 VDT workers are selected randomly comprising 50 male and 50 female. All of them had a minimum work experience of 05 years in their present occupation.

2.1. Questionnaire study

A detailed study was based on a modified Nordic questionnaire 12 was performed among these VDT workers for study period. The questionnaire contains a series of objective type questions with multiple-choice responses, such as: Did the subject feel any kind of pain in the body or not? If yes, then which part of the body was most affected? The Nordic questionnaire was selected to measure the outcome of epidemiological studies on musculoskeletal disorders.

2.2. Statistical analysis

Student "t" test was performed among the male and female VDT workers to find out whether there is any significant difference between the physical parameters for the chosen level of significance ($p < 0.05$). A two-tail chi square test of independence was applied to determine whether or not the test item had any significant association with discomfort feeling. The computed χ^2 was next compared with the critical values χ^2 for the chosen level of significance ($p < 0.05$). Statistical analysis was performed using the statistical package PRIMER OF BIOSTATISTICS (Primer of Biostatistics 5.0.msi, Msi Version = 1.20.1827.0, Primer for Windows, Mc- Graw-Hill).

3. Results

The mean values of age, stature and weight of the both male and female VDT workers are shown in table 1. From the table 1, it was observed that there was significant change in physical parameters (height, weight) between the male and female VDT workers.

From this study it was revealed that female suffered more discomfort than male VDT workers. From the figure-1 it was observed that 74 percent male and 84 percent female VDT suffered from discomfort feeling respectively. Lower back problem is the main problem among VDT workers.

Table-1: Demographics of the male and female VDT / office workers

Parameters	Male VDT workers	Female VDT workers	t value	P value
Age (yrs)	29.9 ± 7.58	29.0 ± 7.23	0.58	0.56
Stature (cm)	170.0 ± 4.64	159.9 ± 4.91	10.57	P<0.001
Weight (kg)	62.6 ± 6.38	54.8 ± 5.19	6.68	P<0.001

Table-2: Discomfort feeling (pain) at different body parts among Male and Female VDT / office workers

Different parts of the body	Male VDT workers n (%)	Female VDT workers n (%)	χ^2	P value
Neck	33 (66)	35 (70)	0.046	0.830
Shoulder	21 (42)	20 (40)	0.000	1.000
Wrist	11 (22)	15 (30)	0.468	0.494
Elbow	26 (52)	29 (58)	0.162	0.688
Fingers	06 (12)	09 (18)	0.314	0.575
Forearms	22 (44)	24 (48)	0.040	0.841
Upper back	03 (06)	05 (10)	0.136	0.712
Lower back	44 (88)	47 (94)	0.488	0.485

A vast majority (94 percent female and 88 percent male) reported discomfort feeling in the lower back due to improper back support in the chair while working in the office (table 2).

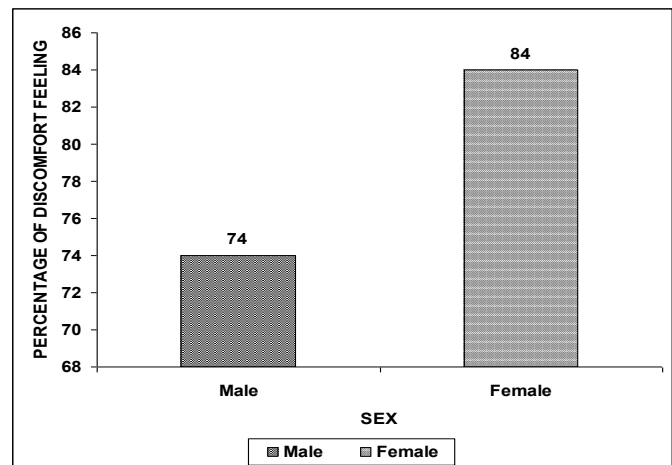


Figure-1: Comparative study of Discomfort feeling among male and female VDT / office workers

From this study (table 2) it was also observed that 70 female VDT workers and 66 percent male VDT workers suffered from neck pain. Elbow and shoulder which are affected next in order. 42 percent male VDT workers and 40 percent female VDT workers also suffer from discomfort feeling at shoulder. Whereas both gender of VDT workers (male and female) suffered from pain in the elbow due to repetitive forceful exertion for prolonged period of time. VDT workers of both group also suffered

from forearms, fingers and upper back pain due to improper workstation and continuous work. Table-2 also shows that there was no significant change in discomfort feeling among the male and female VDT workers.

From this study (figure 2) it was observed that VDT workers > 40 years of age suffered from maximum discomfort.

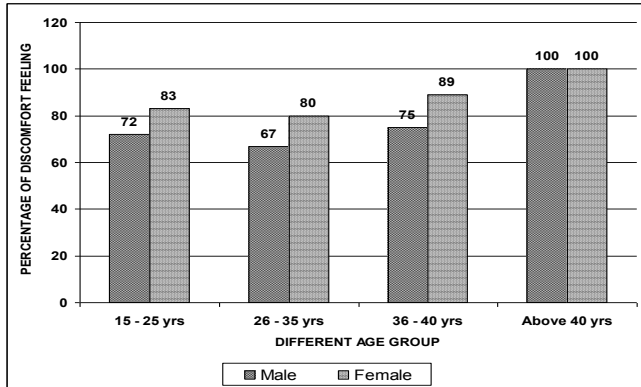


Figure-2: Discomfort feeling (pain) among the different age group of male & female VDT / office workers

feeling followed by 35 - 40 years, 25 - 35 years and 15 - 25 years. This study revealed that 100 percent of VDT workers > 40 years of age suffered discomfort feeling.

Whereas 89 percent of female VDT workers of 35-40 years and 75 percent of male VDT workers of 35-40 years suffered discomfort feeling. This study (figure 2) also shows that 80 percent female and 67 percent male VDT workers of 26-35 years suffered discomfort feeling. So from this study it was clearly observed that the discomfort feeling was relatively high among the aged VDT workers.

Duration of computer use among the VDT workers may cause one of the leading factors for the prevalence of MSD. This study (table 3) shows that the duration of computer or VDU used by the VDT workers for 4-6 hours suffered maximum discomfort feeling (pain).

Table-3: Duration of computer use and the prevalence of pain among Male and Female VDT / office workers

Duration of computer use	Office Workers (Gender wise)			
	Male VDT workers		Female VDT workers	
	No. of subjects	No. of subjects affected	No. of subjects	No. of subjects affected
<2 h/day	03	01	05	03
2-4 h/day	14	19	15	13
4-6 h/day	29	24	27	23
>6 h/day	04	03	03	03

Table 4 mainly shows that the different visual problems among the male and female VDT workers. This study (Table 4) shows that male has higher visual problems than

female VDT workers, but there is no significantly change in visual problems among the male and female VDT workers.

Table-4: Comparative Visual Stress among the Male (N = 50) and Female (N = 50) VDT / office workers

Visual Problems among VDT workers	Male VDT workers n (%)	Female VDT workers n (%)	χ^2 value	p value
Irritation in eye	38 (76)	29 (58)	2.895	0.08
Watering of eyes	20 (40)	13 (26)	1.628	0.20
Headache	42 (84)	36 (72)	1.457	0.22

4. Discussion

Musculoskeletal disorder is commonly caused by overexertion, muscle strain and repetitive strain. It is believed that improper VDT workstation design contributes to the development of these disorders. Awkward posture is highly related to musculoskeletal pain and eyestrain in VDT workers. The VDT operator usually complains of discomfort in the back, neck, elbow, arm, shoulders, and occasionally in the legs.

The result of the study reveals that the VDT operators who are engaged in rigorous hand intensive jobs for prolonged period of time developed pain in the upper extremities of the body. This result was supported by various researchers, according to them, prolonged work in fixed or awkward positions lead to musculoskeletal disorder among VDT workers.¹³⁻¹⁵

This study also revealed that female VDT workers suffer more discomfort feeling than male VDT workers. This result corroborates with the work of others and they also suggested that female appear to suffer higher rates of repetitive strain injury generally in industry, along with higher rates of carpal tunnel syndrome both in workplace settings and in the general population.^{16, 17} According to Eltayeb et al. neck and shoulder complaints are reported more frequently than complaints in any of the other upper body regions.¹⁸ Further, women had higher 12-month's prevalence rates of upper extremity musculoskeletal complaints than men VDT workers. Toomingas et al. suggested that 86% female and 68% male call centre staff reported musculoskeletal pain with the neck and shoulder regions most frequently affected.¹⁹

This study also revealed that both male and female VDT workers suffered from discomfort feeling (pain) in the different parts of the body especially at the upper extremities and the lower back of the body. This result was mainly supported by researchers, according to them, incidence of VDT workers musculoskeletal disorders of the

neck, shoulders and lower back is associated with prolonged sedentary work with constrained posture.²⁰⁻²²

This study shows that among the upper extremities of the body, neck and shoulder is the prime one, in which the both the male and female VDT workers suffered maximum discomfort feeling. This result was supported by Klusmann et al. according to them among the upper parts of the body, neck and shoulder pain is the prime parts which affected most.²³ Korhonen et al. reported the annual incidence of neck pain among VDU users to be 34%.²⁴ A prospective cohort study from the USA reported the annual incidence of neck/shoulder musculoskeletal symptoms to be 58 cases/100 person-years.²⁵ Cross sectional studies of VDU users have reported a prevalence of 10-62% of musculoskeletal symptoms in the neck/shoulder region among VDU users.²⁶⁻²⁹ Several studies also suggested that an increased prevalence of upper extremity musculoskeletal symptoms may be associated with increased computer mouse use.^{27, 30, 31}

This study also showed that among the different parts of the body, low back is the main part which affected most among the both male and female VDT workers. The feeling of discomfort in the low back may be due to adoption of awkward posture for prolonged period of time. This result corroborates with the others work and according to them Low back pain and neck pain were found to be the highest pain complaint among the VDT workers.^{32, 33} Gangopadhyay et al also stated that working in an awkward posture for prolonged period of time may lead to severe musculoskeletal disorder.³⁴⁻³⁷

This study also revealed that prolonged period of work may lead to discomfort feeling among the VDT workers. This result was supported by Kryger et al.³⁸ They suggest that job demands, time pressure and more than 15 h keyboarding per week were identified as risk factors for musculoskeletal disorder. This suggest also suggest that above 40 years of VDT workers of both group suffered maximum discomfort feeling (pain) than other lesser (36-40 yrs; 26-35 yrs and 15 -25 yrs) age group.

The other important problems among the VDT workers were visual stress/discomfort. Visual stress/discomfort is a commonly reported symptom which include headache, watering of eyes, burning or itching eyes (Irritation in eye) and fatigue among the VDT workers. Visual discomfort also include double vision affect workers in all office environments, however they are generally more common and severe in the video display terminal

environment. In this study the VDT workers suffered from headache, Irritation in eye and watering of eyes due to the glare and reflection from the monitor screen. This result was supported by Talwar et al. and suggested that visual problems among the VDT workers due to the glare and reflection from the monitor screen.³⁹ Sheedy also reported that 50-90% of computer users experienced the symptoms of computer vision syndrome.⁴⁰ Computer vision syndrome is a serious problem associated with computer use and about three-quarter of computer users were suffering.

5. Conclusion

From this study it is observed that female VDT workers suffered more discomfort feeling than male VDT workers. This study also suggest that both group of VDT workers suffered discomfort (pain) in the lower back and the upper extremities (especially at neck, shoulder, elbow, wrist and arm) of the body due to working in a prolonged period of time in a improper work station. This study also stated that both male and female VDT workers suffered from visual stress due to prolonged period of work and without using of antiglare screen in a monitor.

To help control VDT-related injuries, many guidelines and standards for designing VDT workstations have been suggested, these are:

1. Keep the shoulder relaxed when using the keyboards or mouse.
2. Sit on the chair with the lower back fully supported by backrest.
3. Visual display screen should be about one arms length away.
4. Top of the visual display screen should be slight below of the eye level of the VDT workers.
5. Use arm rest while typing in a keyboard.
6. Perform stretching exercise regularly.
7. The workstation modifications should be done by modifying the workstation equipment, mainly included adjustments of the screen, mouse, keyboard, forearm supports, and chair.

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