Prevalence of Musculoskeletal Symptoms among Visual Display Terminal Users

Shahab A. Alazawi (M.B.Ch.B, D.C.M, F.I.B.M.S. Occup & Environ Medicine)
Department of Community Medicine, Diyala Medical College, Diyala University, Iraq

Abstract

Background: Musculoskeletal pains are the main health problems reported by computer workers. There has been an increased frequency of ergonomic injuries and illness in the computer workstation. The increase in Visual Display Terminal (VDT) use has been associated with an increased prevalence of disorders in the neck, upper extremities and lower back of the body. Furthermore, poor workstation design has been associated with an increased risk of developing these symptoms. Aims: To estimate the prevalence of musculoskeletal disorders among visual display terminal (VDT) users. Method: A cross-sectional study was conducted over a two month period during the summer of 2010 in Baquba. One hundred twenty VDT workers are selected randomly comprising 60 male and 60 female. Questionnaire was performed among these VDT workers for study period to measure the prevalence during the previous 12 months of musculoskeletal disorders. The survey was carried out on the effect of work with VDTs on musculoskeletal disorders in workers in the computer workstation. Results: The result of this study was that the neck, shoulder and lower back problem are the main problems among VDT workers. Both male and female VDT workers also suffered pain in neck, shoulder, low back, forearm, 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. Prolonged period of work in an awkward posture mainly lead to discomfort feeling among the VDT workers. The 12 month prevalence of musculoskeletal complaints in various body parts were: neck (30.0%), back (28.3%), shoulder (18.3%), wrist (8.3%), forearm (6.6%) elbow (5.8%) and (2.5%) fingers. It was found that there was a gradual increase in musculoskeletal complaints as the number of hours spent for working on computers daily increased. Conclusions: It is concluded that; The VDT workers suffered pain mainly in neck, upper extremities and lower back of the body. As the duration of job increased, the risk for musculoskeletal symptoms significantly increased. Recommendation: More consideration should be paid to the ergonomics of workstations, the placing of the mouse, the postures of the upper extremities and the handling of the mouse.

Key words: prevalence; musculoskeletal symptoms; workstations; VDT.

Introduction

Musculoskeletal problems among office workers have become the subject of growing concern with the expanding use of visual display terminals (VDTs). Musculoskeletal pain and visual discomfort are the main health problems reported by computer workers [1,2].

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 is one of the prime one. Musculoskeletal disorders occur in every kind of occupation and industry. Musculoskeletal disorders occur gradually over a relatively long period of time of exposure to the corresponding contributing factors [3]. Prevalence of musculoskeletal disorders among keyboards users has been reported to be as high as 81% [4]. Similarly, 86% female and 68% male call centre staff reported musculoskeletal pain with the neck and shoulder regions most frequently affected [5].

According to some studies increased use of personal computers has focused our attention on work-related musculoskeletal

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disorders. Physical workplace factors (e.g. prolonged static muscle load, workstation factors) have been identified as risk factors for musculoskeletal diseases [6–7]. In the computing environment, incorrect computer workstation set-up, prolonged work in fixed or awkward positions, seated and static work and overuse have been identified as musculoskeletal diseases risk factors [8,9,10]. A relationship between upper extremity pain and duration of keyboard use has also been documented [11]. In addition relationships exist between psychosocial factors (e.g. social support from colleagues/supervisors) and musculoskeletal pain [12,13]. For example, high job demands, time pressure and more than 15 h keyboarding per week were identified as risk factors for forearm pain. VDT operator usually complains of discomfort in the back, arm, shoulders, neck and occasionally in the legs [14].

Aims

To estimate the prevalence of musculoskeletal disorders among visual display terminals (VDT) users.

Materials and Methods

A cross-sectional study was conducted over a two month period during the summer of 2010 in the different office premises; private and public sector organization, involved in data entry work in the computer workstation and VDT users to assess health of the VDT workers in Baquba.

After selections of the locations, 120 VDT workers are selected randomly comprising 60 male and 60 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. The questionnaire consisted of 12 questions; the questions concerning personal history, the work task and pain during the previous 12 months in the neck, shoulders, lower back, elbows, forearms and wrists, and fingers have been used in this paper. The use of the computer and the mouse refers to the number of self-reported hours per average workday in the previous year and experienced pain refers to any pain in the previous 12 months.

Individuals who had an operation in the relevant regions, a history of fall or accident, or any coexistent disease that might cause soft tissue pain (rheumatoid arthritis, neuritis, diabetes, etc.) were excluded from the study.

Statistical analyses:

A statistical analysis was conducted by SPSS statistical software v.13.0. Chi-square test was used, level of significance ($p < 0.05$).

Result

Table 1 show the distribution of cases according to body region that female suffered more discomfort than male VDT workers. Lower back problem is the main problem among VDT workers, 81.6 percent female and 76.6 percent male reported discomfort feeling in the lower back due to improper back support in the chair while working in the office, 61.6 percent female VDT workers and 58.3 percent male VDT workers suffered from neck pain, 51.6 percent female and 46.6 percent male which are suffered from pain in the elbow due to repetitive forceful exertion for prolonged period of time, 41.6 percent female VDT workers and 38.3 percent male VDT workers also suffer from discomfort feeling at shoulder. VDT workers of both group also suffered from forearms, wrist and fingers due to improper workstation and continuous work. Table-1 also shows that there was no significant change in discomfort feeling among the male and female VDT workers. Table 2 shows for distribution of cases according to duration of computer use. It has been showing that the duration of computer or the VDT workers for 4-6 hours/day suffered maximum musculoskeletal discomfort.

The Prevalence of musculoskeletal complaints among the VDT workers

Figure 1 shows that the musculoskeletal problems experienced during work after starting the current job were fairly common among the VDT workers. The 12 month prevalence of musculoskeletal

complaints in various body parts was: Thirty-six (30.0%) had neck pain, 34 (28.3%) had back pain, 22 (18.3%) had shoulder pain, 10 (8.3%) had wrist pain, forearms 8 (6.6%), elbow 7 (5.8%) and 3 (2.5%) had fingers pain. Frequent users had significantly more musculoskeletal problems than the infrequent users in the neck and shoulder regions.

Discussion

A high prevalence of neck, lower back and shoulder pain/discomfort was reported in this study. This corresponded with findings from other studies on data processing and computer work [3,4,5,6]. 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 [7,8,9,10]. Musculoskeletal problems were fairly common among the VDU workers surveyed. Back pain and neck pain were present among over 35% of subjects. Shoulder pain and wrist pain were less prevalent and were present in about 20% of subjects. Arm pain was the least common with 8% of the subjects being affected. The pattern of distribution of pain in different body parts was very similar to those found in other studies with the back, neck and shoulder regions being most commonly affected, [11,12,13,15]. The most frequently reported area of concern was the neck, which was similar to findings from Toomingas *et al.* 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, 17,18,19]. According to Eltayeb *et al.* neck and shoulder complaints are reported more frequently than complaints in any of the other upper body regions. Further, women had higher 12- month's prevalence rates of upper extremity musculoskeletal complaints than men VDT workers [20]. 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 Klussmann *et al.* according to them among the upper parts of the body, neck and shoulder pain is the prime parts which affected most [21]. Korhonen *et al.* reported the annual incidence of neck pain among VDU users to be 34% [22]. A prospective cohort study from the USA reported the annual incidence of neck/shoulder musculoskeletal symptoms to be 58 cases/100 person-years. Cross sectional studies of VDU users have reported a prevalence of 10–62% of musculoskeletal symptoms in the neck/shoulder region among VDU users. Several studies also suggested that an increased prevalence of upper extremity musculoskeletal symptoms may be associated with increased computer mouse use. 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. Gangopadhyay *et al* also stated that working in an awkward posture for prolonged period of time mar lead to severe musculoskeletal disorder [23]. This study also revealed that prolonged period of work may lead to discomfort feeling among the VDT workers. There is strong association between the duration of daily work with a computer and pain or the duration of daily mouse use and pain, but the workers' rating of the ergonomics of their workstations as poor was strongly

associated with an increased prevalence of pain. This result was supported by Kryger *et al.* They suggest that job demands, time pressure and more than 15 h keyboarding per week were identified as risk factors for musculoskeletal disorder [24].

Conclusions

Musculoskeletal symptoms among the VDT workers are common; the findings showed that cumulative computer use time increased the risk of musculoskeletal disorders in neck, lower back and the upper extremities. As the duration of job increased, the risk for musculoskeletal symptoms significantly increased.

Recommendations

Further studies with the inclusion of a larger number of VDT cases and potential risk factors would help clarify the role of variables in the etiology of musculoskeletal symptoms disorders. More consideration should be paid to the ergonomics of workstations, the placing of the mouse, the postures of the upper extremities and the handling of the mouse.

References

1. Abib AH, Dutta SP. Epidemiological investigation of workdays lost due to VDT related injuries. Occup Ergon 1998; 1:285–290.
2. Aaras A, Fostervold KI, Ro O, et al. Postural load during VDU work: acomparison between various work postures. Ergonomics 1997; 40:1255–1268.
3. Kamwendo K, Linton SJ, Moritz U. Neck and shoulder disorders in medical secretaries. Scand J Rehabil Med 1991; 23:127–133.
4. Feveile H, Jensen C, Burr H. Risk factors for neck– shoulder and wrist–hand symptoms in a 5-year follow-up study of 3,990 employees in Denmark. Int Arch Occup Environ Health 2002;75:243–251.
5. Buckle P, Devereux J. The nature of work-related neck and upper limb musculoskeletal disorders. Appl Ergon 2002;33: 207–217.
6. Hales TR, Bernard BP. Epidemiology of work-related musculoskeletal disorders. Orthop Clin N Am 1996;27:679–709.
7. Toivonen R, Takala EP. Assessment of the dose–response relationship between VDU work and discomfort. In: Bullinger HJ, Ziegler J, eds. Human-Computer Interaction: Ergonomics and User Interfaces. New Jersey: Lawrence Erlbaum Associates, 1999; 27–30.
8. Carter JB, Banister EW. Musculoskeletal problems in VDT work: a review. Ergonomics 1994;37:1623–1648.
9. Fogleman M, Brogmus G. Computer mouse use and cumulative trauma disorders of the upper extremities. Ergonomics 1995;38:2465–2475.
10. Macfarlane GJ, Hunt IM, Silman AJ. Role of mechanical and psychosocial factors in the onset of forearm pain: prospective population based study. Br Med J 2000;321:1–5.
11. Ong CN. Musculo-skeletal disorder, visual fatigue and psychological stress of working with display units: current issues and research needs. In: Luczak H, Cakir A, Cakir G, eds. Work with Display Units 92. Amsterdam: North-Holland, 1993;54: 221–228.
12. Pickett CWL, Lees REM. A cross-sectional study of health complaints among 79 data processing operators using

video display terminals. J Soc Occup Med 1991;41:113–116.
13. Yu ITS, Wong TW. Musculoskeletal problems among VDU workers in a Hong Kong bank. Occup Med 1996; 46: 275–280.
14. Straker L, Mekhora K. An evaluation of Visual Display Unit placement by electromyography, posture, discomfort and preference. Int J Ind Ergon 2000; 26:389–398.
15. Smith M, Carayon P. Work organisation, stress and cumulative truama disorders. In: Moon SD, Sauter SL, eds. Beyond Biomechanics. Psychological Aspects of Musculoskeletal Disorders in OfficeWork. London: Taylor & Francis, 1996; 23–42.
16. Burdorf A, Sorock G. Positive and negative evidence of risk factors for back disorders. Scand J Work Environ Health 1997;23:243–256.
17. Verma SB, Computers and Vision. Journal Postgrad Med 2001; 47: 119.
18. Jensen C, Finsen L, Søgaard K, *et al.* Musculoskeletal symptoms and duration of computer and mouse use. Int J Ind Ergonomics 2002; 30:265–275.
19. Toomingas A, Nilsson T, Hagberg M, Norman K, Tornqvist EW. Symptoms and clinical findings from the musculoskeletal system among operators at a call center in Sweden—a 10 month follow-up study. In: Luczak H, Cakir AE, Cakir G, eds. WWDU 2002—World Wide Work. Proceedings of the 6th International Scientific Conference on Work with Display Units. Berlin: Ergonomic Institut fur Arbeits und Sozialforschung, Forschungsgesellschaft mbH, 2002; 28:676–678.
20. Eltayeb S, Staal J B, Kennes J, Lamberts P H G and de Bie R A, Prevalence of complaints of arm, neck and shoulder among computer office workers and psychometric evaluation of a risk factor questionnaire BMC Musculoskeletal Disorders 2007; 8:68.
21. Klussmann A, Gebhardt H, Liebers F and Rieger M A, Muscu-loskeletal symptoms of the upper extremities and the neck: A cross-sectional study on prevalence and s ymptom-predicting factors at visual display terminal (VDT) workstations, BMC Musculoskeletal Disorders 2008; 9:96.
22. Korhonen T, Ketola R, Toivonen R, *et al.* Work related and individual predictors for incident neck pain among office employees working with video display units. Occup Environ Med 2003; 60:475–482.
23. Gangopadhyay S, Das B, Das T. and Ghoshal G. An Ergonomic Study On Posture Related Discomfort Feeling Among The Pre-adolescent Agricultural Workers of West Bengal, India. International Journal of Occupational Safety and Ergonomics (JOSE) 2005; 11:3.
24. Kryger AI, Andersen JH, Lassen CF, *et al.* Does computer use pose an occupational hazard for forearm pain; from the NUDATA study. Occup Environ Med 2003;60:12 –14.

Table 1: Frequency distribution of musculoskeletal symptoms according to body region.

Body region	Female N (%)	Male N (%)	χ_2	P-value
Lower back	49 (81.6)	46 (76.6)	0.05	0.825
Neck	37 (61.6)	35 (58.3)	0.03	0.857
Elbow	31 (51.6)	28 (46.6)	0.10	0.756
Shoulder	25 (41.6)	23 (38.3)	0.06	0.812
Forearms	21 (35)	22 (36.6)	0.02	0.898
Wrist	16 (26.6)	12 (20)	0.45	0.503
Fingers	10 (16.6)	07 (11.6)	0.45	0.501

Table 2: Daily work with a computer and the prevalence of musculoskeletal discomfort during the previous 12 months

Duration of computer use	Prevalence (%)	
	Male VDT workers	Female VDT workers
<2h/day	04	6
2-4/day	16	17
4-6/day	35	33
>6h/day	05	04

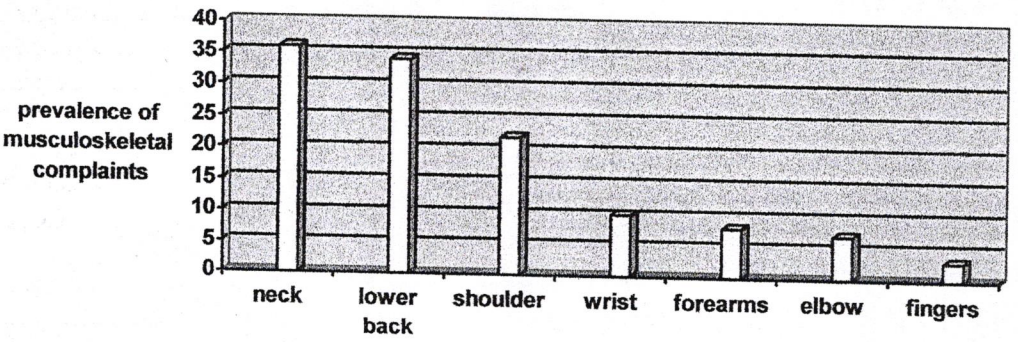

Figure 1: Prevalence of musculoskeletal complaints