Musculoskeletal problems among workers of an Iranian communication company

Abstract

Introduction: Work-related musculoskeletal disorders (WMSDs) are a common health problem throughout the world and a major cause of disability in the workplace. Awkward working posture is a main risk factor for developing WMSDs. Assessment of exposure level to WMSDs risks can be an appropriate base for planning and implementing interventional ergonomics program in the workplace. This study was conducted among workers of an Iranian communication company with the objectives of a) determination of WMSDs prevalence and b) assessment of exposure level to WMSDs risks. Materials and Methods: In this cross-sectional study, 85 randomly selected workers from assembly line and closed circuit TV (CCTV) participated. Nordic musculoskeletal questionnaire (NMQ) was used to study prevalence of WMSDs and rapid upper limb assessment (RULA) technique was applied to assess physical exposure to the risks. Results: The results of NMQ revealed that WMSDs occurred at an high rate. The highest rates of WMSDs prevalence were reported in shoulders (73%), knees (67.1%) and back (66.7%). RULA showed that the Grand Score of 88.1% of cases were high and very high (action levels 3 and 4). Significant association was found between risk level and musculoskeletal symptoms in lower back (P<0.05). Conclusion: Given the association between RULA score and the prevalence of the problems, reducing RULA score by designing ergonomic workstation may reduce the prevalence of WMSDs among the workers.

Key words: Assembly workers, communication industry, rapid upper limb assessment technique, work-related musculoskeletal disorders

INTRODUCTION

Musculoskeletal disorders (MSDs) represent one of the leading causes of occupational injury and disability in the developed and industrially developing countries.[1-4] The economic loss due to such disorders affects not only the individual but also the organization and the society as a whole.[5] At present time, MSDs is one of the most important problems ergonomists are encountered in the workplace around the world.[5] In many countries, the prevention of work-related musculoskeletal disorders (WMSDs) has been considered as a national priority.[6]

WMSDs is a worldwide concern and distributed among both Industrialized Countries (ICs) and Industrially Developing Countries (IDCs). In IDCs, the problems of workplace injuries are extremely serious.[7] Poor working conditions and the absence of an effective work injury prevention program in IDCs has resulted in a very high rate of MSDs.[7]

Risk factors of WMSDs are known to include workplace activities such as heavy load lifting, repetitive tasks and awkward working postures,[8] while demographic characteristics and psychosocial factors are also known to be important predictive variables.[9-11]

It has been widely accepted that awkward and constrained postures result in musculoskeletal stress on different body regions of seated workers[12] and are a major factor in the development of musculoskeletal disorders.[13-17] Poor postures have also been found to be associated with decreased efficiency of performance, an important cause of which was recognized to be the body discomfort resulting from the restricted postures.[18] The need to improve working posture has been documented in a number of studies which have shown a relation between stressful postures at work and functional disturbance or pain in various parts of the musculoskeletal system.[19] The effect of poor postures will continue unless proactive steps are taken to evaluate and reduce the problem.
More suitable working postures may have a positive effect on workers’ musculoskeletal systems and may allow for more effective control of work performance and reduction in the number of occupational injuries.[20]

In communication industry, where electronic devices and equipments for communication purposes are manufactured and assembled, workers are involved in long hours of static work. In this industry, awkward posture and repetitive movements are very common [Figures 1 and 2]. The majority of job activities are characterized by a sitting posture with the worker’s head and trunk flexed forward and shoulders flexed and abducted. In this situation, high rate of WMSDs occurrence are expected.

As far as the researchers know, no ergonomics study has been conducted in Iranian communication industry to determine the prevalence of WMSDs and assess physical exposure to work-related musculoskeletal risks. Therefore, the present study was done in a communication company with the objectives of a) determination of WMSDs prevalence rate among workers and b) assessment of level of workers’ exposure to WMSDs risks. It is believed that the results of this study can be an appropriate base for planning and implementing interventional ergonomics program in the workplace and improving workers’ health and quality of work in communication industry.

**MATERIALS AND METHODS**

This cross-sectional study was conducted in the assembly line and closed circuit TV (CCTV) units of an Iranian communication company. Totally, 500 male and female workers were employed in these units. In this study, 85 workers from the two units with at least one year of job tenure were randomly selected and included in the study. Workers with background diseases or accidents affecting musculoskeletal system were excluded from the study. Data were collected via anonymous questionnaires. The questionnaire consisted of two parts and covered the following items: a) personal details (including sex, age, job tenure, health and medical background); and b) musculoskeletal problems in different body regions. The general Nordic Questionnaire of musculoskeletal symptoms[21] was used to examine reported cases of MSDs among the study population. Reported MSDs symptoms were limited to the past 12 months. The units were visited and the questionnaires were completed by interviewing the workers.

In order to assess physical exposure to work-related musculoskeletal risks, rapid upper limb assessment (RULA) technique, which is known as a pen-paper observational method, was applied.[22] According to this method, a score is calculated for the posture of each body part. Score 1 indicates the most neutral posture and score 4 shows the worst position. The combined individual scores for shoulder, elbow and wrist give score A and those for neck, trunk and legs give score B. Muscle use and force exerted are attributed a score of 0 or 1. These scores are added to scores A and B to obtain scores C and D, respectively. Combination of scores C and D, called Grand Score (ranging from 1 to 7), shows the musculoskeletal loading associated with the worker’s posture. Low Grand Scores (1 or 2) indicate acceptable working posture (action level 1). For Grand Scores of 3 or 4, further investigation is needed and changes may be required (action level 2). Prompt investigation and changes are required soon for scores of 5 or 6 (action level 3). Finally, immediate investigation and changes are required for Grand Score of 7 (action level 4).

To conduct the assessment by RULA system, in each workstation, the worker was videotaped during her/his routine job activities. In the lab, the tape was reviewed; awkward postures were selected and analyzed. The RULA Grand...
Score was then calculated for each case. Consequently, the level of interventional action required to reduce the risks of musculoskeletal injury due to physical loading on the worker was determined.

Upon completion of the field survey, collected data were transferred into the computer for statistical analysis. Statistical analyses were performed using SPSS (Ver. 13). Independent t-test, chi-square and Mann-Whitney tests were used to assess associations between personal and work variables with reported musculoskeletal symptoms.

RESULTS

Table 1 shows the mean and standard deviation of age and job tenure of the workers participated in the study. Table 2 presents the prevalence of MSDs symptoms in different body regions of the workers during the last 12 months. As Table 2 shows, the most commonly affected regions among the workers are shoulders (73%), knees (67.1%), lower back (66.7%), upper back (66.7%), wrists/hands (64.7%) and neck (64.7%).

Statistical analyses showed significant association between job tenure and reported musculoskeletal problems in knees and upper back (P<0.05), such that with increasing job tenures, the prevalence rate of problems in these regions increased. No association was found between sex and prevalence rate of reported problems in different regions of musculoskeletal system (P>0.05).

Table 3 presents the results of assessment of physical exposure to work-related musculoskeletal risks. As shown in Table 3:

a) in no cases, action level was 1.
b) in 11.7% of the workers studied, RULA Grand Score was between 3 and 4 indicating that the level of exposure to musculoskeletal risks needed considering (action level 2).
c) in 75.2% of the workers studied, RULA Grand Score was between 5 and 6 indicating that the level of exposure to musculoskeletal risks was high and ergonomics intervention to decrease exposure level seemed essential (action level 3).
d) in 12.9% of the workers studied, RULA Grand Score was 7 indicating that the level of exposure to musculoskeletal risks was very high and immediate ergonomics intervention to decrease exposure level seemed essential (action level 4).

Table 4 demonstrates the prevalence rate of reported symptoms in different body regions in three levels of risk of exposure among the workers studied. As shown in Table 4, those who had very high RULA risk level of exposure reported more musculoskeletal problems in different body regions, with exception for neck. Mann-Whitney analysis revealed that there was a significant association between RULA risk level and prevalence rate of reported musculoskeletal problems in lower back (P<0.05).

DISCUSSION

The questionnaire showed that symptoms from the musculoskeletal system were common among the workers studied. Shoulders, back, wrists/hands and knees symptoms were found to be the most prevalent problems among the workers. High rate of shoulders problem could be attributable to awkward posture due to high table used in the workstations and high rate of back problems could be related to the long
awkward posture of this region and lack of use of backrest while working. These implies that any interventional program for preventing or reducing musculoskeletal problems among the workers should focus on reducing physical exposure to the MSDs risk factors of these regions.

The results also indicated that age was not significantly associated with musculoskeletal symptoms in different body regions. In some other studies, i.e., on ship building workers and VDT operators, the same result has been reported.[23-25] No association was found between sex and MSDs prevalence rate. Although it is in agreement with the results of other studies,[26,27] but many studies have showed association between sex and musculoskeletal symptoms.[28-30]

Based on the results of physical exposure to work-related musculoskeletal risks assessment by RULA, in 88.1% of the workers studied the level of exposure to musculoskeletal risks was high and very high (action level 3 and 4). This indicated that the jobs and working conditions in the assembly line and CCTV units were conducive for developing WMSDs. Therefore, ergonomics interventions seemed necessary to improve working conditions and decrease exposure level.

The results also demonstrated that there was a direct association between RULA risk level and prevalence rate of the reported symptoms in lower back with the significant association. This is in line with the findings of similar studies.[31,32]

Based on the results of RULA, awkward working postures and static work were found to be the major risk factors that the workers were encountered. Since the postural problems have been found to be largely caused by improperly designed and ill-arranged workstation furniture,[33] reducing the RULA Grand Score via redesigning workstations was strongly recommended. Regarding this, the following corrective measures could be taken into consideration for reducing exposure level and consequently preventing WMSDs in this company:

a) Reducing the height of tables in accordance to the workers’ anthropometric characteristics.

b) Using seats with appropriate backrest in the workstation.

c) Designing sitting-standing workstations to avoid posture fixation.

d) Conducting workers training program on working posture.

e) Devising an appropriate work-rest cycle.

Based on the findings, it was concluded that WMSDs occurred in high rate in this company. Workers’ level of exposure to WMSDs risks was high. Taking corrective measures for reducing risk level into consideration seemed essential. Any ergonomics intervention program in the workplace should be focused on eliminating awkward postures of shoulders, back and neck. Redesigning workstations based on ergonomics principles were recommended.

ACKNOWLEDGMENTS

Funding through Shiraz University of Medical Sciences, Contract No. 84-2689, supported this study.

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Source of Support: Shiraz University of Medical Sciences, Conflict of Interest: None declared.