

Musculoskeletal complaints associated with computer use and its ergonomic risks for office workers of a medical sciences university in Tehran

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ABSTRACT

Purpose: To determine the musculoskeletal complaints associated with using computer and its ergonomic risks for office workers of a medical sciences university in Tehran.

Materials and Methods: In this cross-sectional study, a background questionnaire was used to determine individuals and computer use habits' characteristics. A total number of 164 office workers of AJA University of Medical Sciences participated in this study. Musculoskeletal complaints were assessed using standardized Nordic questionnaire, and ergonomic risk assessment was done using rapid office strain assessment (ROSA) checklist. All data were analyzed by Statistical Package for Social Sciences (SPSS) software version 17.

Results: A number of 123 participants filled the questionnaires. The average age of participants was 33.40 ± 6.51 years old. The most frequently reported musculoskeletal complaints were related to neck (58.53%) and lower back (58.53%) for men and knee (66.66%), lower back (64.61%) and neck (61.53%) for women. Based on risk assessment results, 46.34% of office workstations were high risk. The mean ROSA final score was 5.18 ± 1.23 (high risk). The prevalence of musculoskeletal complaints was significantly more among office workers who worked in a high risk environment. The pains were considerable in the neck (74.54%) and lower back (80%).

Conclusion: Prevalence of musculoskeletal complaints among office workers of AJA University of Medical Sciences is high. Ergonomic interventions such as computer workstation redesign and office ergonomics training should be considered to prevent the related health problems, especially for high risk workstations.

Keywords: musculoskeletal complaints; computer use; ergonomics; risk assessment; office workers.

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INTRODUCTION

In recent years, the dramatic growth of computer use in working environments has resulted in some adverse effects among office workers. Musculoskeletal disorders, eye discomfort and headache are common among computer users. Some studies have shown that most computer users are likely to experience musculoskeletal discomforts.¹⁻⁷ Different areas of body can be affected during or after working with computers, especially neck, shoulder, back,

hands and wrists. The symptoms can include pain, tingling and numbness.¹ Signs of musculoskeletal disorders may appear suddenly or gradually.

A combination of ergonomic risk factors such as workstation design, awkward posture, repetitive movements, static postures, working long hours without rest breaks and psychological factors are linked to musculoskeletal disorders.^{3,4} Ergonomic interventions such as computer workstation redesign and office

ergonomics training should be considered to prevent related health problems.^{7,8} In this matter, ergonomic risk assessment can effectively help to identify the most important computer use risk factors and to determine action levels for change based on related problems.⁸

This study investigated the musculoskeletal complaints associated with computer use and its ergonomic risk levels for office workers of AJA University of Medical Sciences in Tehran.

MATERIALS AND METHODS

This cross-sectional study was performed on office workers of AJA University of Medical Sciences. A background questionnaire was used to achieve individual and computer use habits' characteristics such as age, computer usage history, and computer use hours per day.

Standardized Nordic questionnaire was used to survey work-related musculoskeletal complaints and disorders.⁹ This questionnaire is very useful for assessing musculoskeletal problems in epidemiological studies, but it has no use for clinical diagnosis.¹⁰

Ergonomic risk assessment was done using rapid office strain assessment (ROSA) checklist. ROSA is a reliable method which can quickly identify and quantify ergonomic risks associated with computer use.⁸ ROSA scores more than 5 are deemed to be high risk and corrective measures should be considered.

All data were analyzed by Statistical Package for Social sciences Software (SPSS) version 17. Descriptive statistics, Chi-square and compare means test were also used to analyze the data. The level of significance was less than 0.05.

RESULTS

From among all the office workers of the studied medical university, 123 people filled the questionnaires. Demographic information and work characteristics of study population are demonstrated in **Table 1**. The participants included 84 (68.3%) men and 39 (31.7%) women. Their average age was 33.40 ± 6.51 years old. Most participants (87.8%) reported that they used computer more than two hours per day. Forty-three percent of them took a rest break after every hour of working on a computer. About 40% of the participants did physical exercises at least two times per week, whereas 8.1% did no exercises at all.

The prevalence of pain/discomforts of the neck, shoulders, elbows, wrists and hands, upper back, lower back, hips, knees, and legs were 58.53, 42.68, 20.37, 32.93, 32.93, 58.53, 18.29, 25.61, 21.95 percentages for

Table 1. Demographic information and work characteristics of the studied population (n=123).

Characteristics	Groups	No.	%
Gender	Male	84	68.3
	Female	39	31.7
Age (years old)	22-30	48	39
	31-40	56	45.5
	41-51	19	15.4
	52-60	0	0
Computer use (hours per day)	0-2	15	12.2
	2-4	40	32.5
	4-6	37	30.1
	6+	31	25.2
	7+	0	0
Breaks	Every 30 minutes	24	19.5
	Every hour	53	43.1
	Every 2 hours	19	15.4
	More than 2 hours	27	22
Physical exercises	Often (at least two times per week)	49	39.8
	Sometimes (once a week)	36	29.3
	Rarely (1-2 per month)	28	22.8
	Never	10	8.1

men and 61.53, 46.15, 35.89, 58.97, 46.15, 64.1, 35.89, 66.66, 25.64 percentages for women, respectively (**Figure 1**). The prevalence of musculoskeletal complaints of wrists and hands, hips, and knees were significantly higher among women ($P = .028, .034$ and $< .001$, respectively). Totally, the highest prevalence rates of musculoskeletal complaints belonged to the neck, knee and lower back.

The results of ergonomic risk assessment are shown in **Table 2**. The mean ROSA final score was 5.18 ± 1.23 . This score indicated a high risk for the studied population. The mean scores for the chair, monitor and telephone, mouse and keyboard and peripherals were 5.18 ± 1.23 , 2.40 ± 0.54 , 2.71 ± 1.17 , 2.99 ± 0.97 , respectively. Of office workstations, 46.34% were ranked as high risk (ROSA final score more than 5) (**Figure 2**).

The results of risk ranking showed that the prevalence of musculoskeletal complaints was significantly more among office workers who worked in high risk work environments (**Table 3**). This situation was significant in the neck (74.54%) and lower back (80%).

Table 2. Office ergonomic risk factors and its ROSA scores.

	Mean	SD	Min	Max
Chair	5.18	1.23	2	8
Monitor and Telephone	2.40	0.54	1	3
Mouse and Keyboard	2.71	1.17	1	6
Peripherals	2.99	0.97	1	6
ROSA* (final score)	5.18	1.23	2	8

Keys: ROSA, Rapid Office Strain Assessment; SD, standard deviation.

*ROSA: scores of more than 5 are deemed to be high risk (action level: 5).

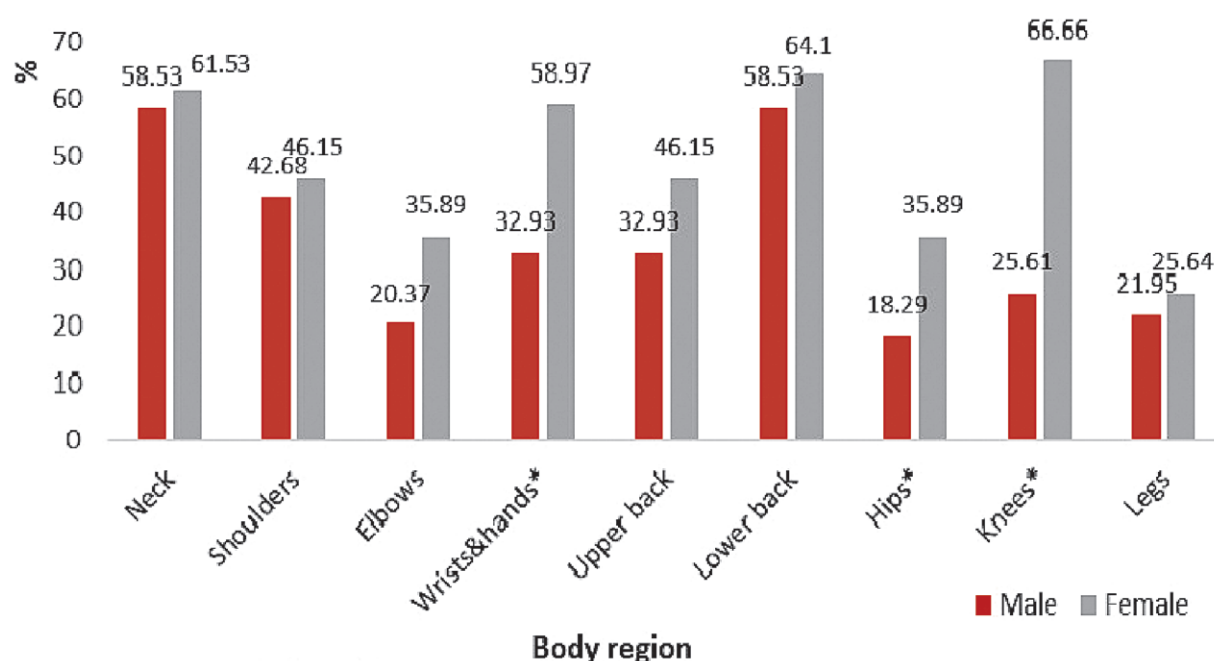


Figure 1. The prevalence of musculoskeletal complaints in the last 12 months based on gender, *Significant differences by Chi-Square test.

Table 3. The prevalence of musculoskeletal complaints in the last 12 months based on risk ranks.

Body Region	Risk Ranks*	Prevalence (%)	P Value**
Neck	Low risk	41.66	.005
	Medium risk	53.33	
	High risk	74.54	
Shoulders	Low risk	33.33	.045
	Medium risk	50.00	
	High risk	47.27	
Elbows	Low risk	19.44	.005
	Medium risk	33.33	
	High risk	25.45	
Wrists and hands	Low risk	22.22	.006
	Medium risk	43.33	
	High risk	52.72	
Upper back	Low risk	27.77	.046
	Medium risk	26.66	
	High risk	49.09	
Lower back	Low risk	47.22	<.001
	Medium risk	40.00	
	High risk	80.00	
Hips	Low risk	13.88	.096
	Medium risk	20.00	
	High risk	32.72	
Knees	Low risk	36.11	.158
	Medium risk	26.66	
	High risk	47.27	
Legs	Low risk	22.22	.014
	Medium risk	16.66	
	High risk	32.72	

*Risk ranks are based on ROSA final scores: lower than 5 shows low risk, equals to 5 shows medium risk, higher than 5 shows high risk.

**P Value < .05 shows significant differences.

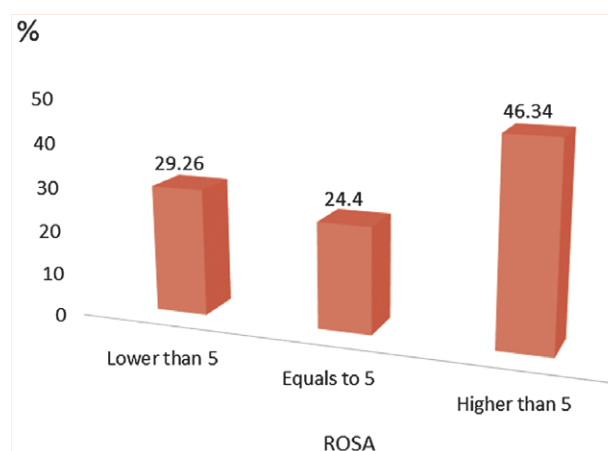


Figure 2. Risk ranking of 123 office workers based on ROSA scores: less than 5 shows low risk, 5 shows medium risk, more than 5 shows high risk.

DISCUSSION

Today, using computers in office environments has increased dramatically. Even though computer has made positive changes in employees' tasks, there are some disadvantages too. Health-related problems especially musculoskeletal discomforts are common among computer users. Ergonomic studies on workers can help reduce the prevalence of work-related musculoskeletal discomforts.

In our study, the prevalence of musculoskeletal complaints was significantly higher among women and the differences were statistically significant for wrists and

hands, hips, and knees. This is consistent with previous studies.^{4,11} In a study by Hupert and colleagues on college students, female students reported significantly more pain in the neck and shoulder than male students.² However, our results showed that the prevalence of musculoskeletal complaints in some body parts were considerably high among both men and women office workers.

High prevalence rates of musculoskeletal discomforts have been reported among office workers especially in those who use computer for long hours. Our results showed that the highest prevalence rates of musculoskeletal complaints were related to the neck and lower back among men and knee and neck among women. Similarly, Wu and colleagues reported that the highest prevalence of work-related musculoskeletal disorders was related to the neck among office workers in China.⁴

About 60% of our participants did not exercise regularly. Some previous studies have suggested that regular exercises are crucial to preventing musculoskeletal disorders.^{12,13} Boocock and colleagues have described exercise and ergonomic education as modifier interventions.¹³ Physical exercises or activities such as walking, running, fitness and stretch exercises can help to relieve tension associated with extensive computer use.

An important factor for preventing musculoskeletal and eye discomforts is to take short breaks from computer work every hour.^{14,15} In our study, 37% of the participants did not take enough breaks during their working hours with computer. Therefore, each employee needs to be aware of the importance of taking rest breaks during computer use. Logaraj and colleagues noted that a five-minute break in every hour can decrease musculoskeletal and eye discomforts without affecting productivity.¹⁴ Similarly, Wu and colleagues suggested that taking enough breaks is an effective way to prevent musculoskeletal discomforts among office workers especially for prolonged computer users.⁴

In the current study, the results of ergonomic risk assessment showed that 46.34% of office workstations were high risk ergonomically with a mean ROSA score of 5.18 (ranging from 2 to 8). Sonne and colleagues suggested that increasing ROSA scores are reflective of increasing musculoskeletal discomfort.⁸ In our study, nonadjustable chairs, awkward postures such as leaning forward which causes no back support, neck flexion, wrist deviation while typing, hardship in using mouse (mouse not in line with the shoulder), and prolonged computer use without taking rest breaks were the common observed risk factors. Based on our obtained risk ranks, about 71% of the studied office workstations require immediate

ergonomic interventions to reduce related risk factors. In addition, two important factors including management support and employees' active involvement are needed to apply an effective interventional plan.¹⁶

CONCLUSION

The prevalence of musculoskeletal complaints is high among office workers of AJA University of Medical Sciences. Ergonomic interventions such as computer workstation redesign and office ergonomics training should be considered to prevent the related health problems, especially for high risk workstations, as soon as possible.

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CONFLICT OF INTEREST

None declared.

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