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MUSCULOSKELETAL HEALTH DISORDERS ASSOCIATED WITH COMPUTER USE AMONG MINIA UNIVERSITY EMPLOYEES

By

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Abstract

Introduction: Occupational use of computers has increased rapidly over recent decades, and has been linked with various musculoskeletal complaints.Repetitive hand movements lead to overload of the upper extremity and neck, and prolonged sitting posture leads to overload on the lower back. Pain in the upper extremities and the neck-shoulder region will affect the workers' health and productivity and it accounts for most work-related time lost. **Aim of work:** To identify the prevalence of musculoskeletal symptoms and associated risk factors among computer office workers in Minia University. **Materials and Methods:** This is a descriptive cross-sectional study; a total of 182 computer office workers in Minia University were interviewed during the period from January to June 2016. Every participant completed a questionnaire that included his socio-demographic data, and information about any job-related musculoskeletal disorders. Describing and determining the site of pain was performed by using the Maastricht Upper Extremity Questionnaire (MUEQ). **Results:** The prevalence of musculoskeletal complaints was arranged in the following order: lower back pain (78%), neck complaints (68.1%) and upper musculoskeletal complaints (61.5%). There were significant associations between doing repetitive tasks, and not taking breaks on the one hand and lower back pain complaint on the other hand ($p<0.001$and 0.03, respectively). **Conclusion:** a high prevalence of musculoskeletal complaints was observed among computer office workers due to poor ergonomic practices in their workplace, being in the same position for long period, doing repetitive tasks and lack of regular breaks. The use of ergonomic principles will reduce these types of pain.

Key words: Ergonomics, Musculoskeletal, Computer users and Low back pain.

Introduction

The introduction of computer data processing changed the character of the office job. Prolonged computer use exposes workers to a high visual and sensory load and using a mouse and a keyboard implies repetitive movements of the upper extremity. The most frequent health problems of computer operators are ocular, musculoskeletal and mental disorders (Blagojević et al., 2012).

Increased computer usage has been linked to high prevalence of musculoskeletal symptoms and these disorders can have detrimental effects on workers' health and productivity (Ortiz-Hernandez et al., 2003 and Griffiths et al., 2007).

Work-related musculoskeletal disorders (MSDs) are a constellation of painful disorders of muscles, tendons, joints and nerves which can affect all body parts; although the neck, upper limb and back are the most commonly affected areas (Levy et al., 2011). MSDs are significant causes of disability claims cost, and lost productivity in many economic sectors worldwide (Varatharajan et al., 2014).

Prevalence data indicated that more than 25% of the European working populations have reported musculoskeletal symptoms (European Agency for Safety and Health at Work, 2008).

A study conducted among bank office workers in Kuwait observed that the most affected body parts were the neck (53.5%), lower back (51.1%), shoulders (49.2%) and upper back (38.4%) (Akrouf et al., 2010).

Aim of work

The aim of the study was to identify the prevalence of musculoskeletal symptoms and associated risk factors among computer office workers in Minia University.

Materials and Methods

Study design: This is a descriptive cross-sectional study.

Place and duration of the study: The study was conducted at Minia University; data were collected twice weekly, on Sunday and Wednesday during the period from January to June 2016.

Study sample: was a group of

182 employees at Minia University using computers in their office work including: Information Technology (IT) section, Data Entry and the Digital Library personnel.

Exclusion criteria were employees having any musculoskeletal problems prior to computer use or due to other causes as accidents or a previous operation.

Study methods:

A structured interview questionnaire was designed and consisted of two parts:-

- The first part included The Maastricht Upper Extremity Questionnaire (MUEQ) which was used to assess the occurrence and nature of complaints of the arm, neck, and shoulders (CANS) among computer workers and their associated physical and psychosocial risk factors. The MUEQ consists of 95 questions and has a completion time of approximately 20 minutes.

- The second part: the questionnaire covered the socio-demographic characteristics (age, gender, and employment status), in addition to a number of items to assess the quality of the work environment and the frequency and nature of complaints, in the neck, shoulder, upper and lower arm, elbow, hand, wrist, and back. Further, several items identified the clinical manifestations of the complaint: i.e. tingling, numbness, weakness, swelling, stiffness and fatigue.

The "complaint cases" were identified as participants who had complaints in the back, neck or the upper extremity for a minimal duration of one week during the preceding 12 months. The questionnaire was derived from a previously published paper studying prevalence of complaints of arm, neck and shoulder among computer office workers and psychometric evaluation of risk factors questionnaire (Eltayeb et al., 2009).

Consent

Each participant was required to sign a written consent after explaining the nature, purpose and uses of the study.

Ethical approval

This study was approved by the Research Ethics Committee of Minia

University. All procedures performed were in accordance with the ethical standards of the Institutional Research Ethics Committee.

Data management

Data were analyzed using SPSS, version 22. Quantitative data were presented by Mean and Standard deviation, while qualitative data were presented by frequency distribution. Chi- square test, Fisher's exact, and z-test were used for proportions. Student t-test was used to compare two means. Spearman's correlation was used to correlate between qualitative data and binary logistic regression . P-value ≤ 0.05 was considered statistically significant and ≤ 0.01 was considered highly significant.

Results

Table (1): Socio-demographic characteristics of the studied subjects.

Socio-demographic characteristics	Mean ± SD (Range)	
Age (years)	39.7 ± 9.5(24-59)	
Period of working in current job (years)	17.7±9.9(2-39)	
Gender	**No**	**(%)**
Male	82	(45.1%)
Female	100	(54.9%)
Residence	**No**	**(%)**
Urban	124	(68.1%)
Rural	58	(31.9%)

Table 1 showed that the age of participants ranged from (24-59) years with a mean of (39.7±9.5), the period of working in current job ranged from (2-39) years with a mean of (17.7± 9.9), (45.1%) were males and urban residents were (68.1%).

Table (2): Frequency of musculoskeletal complaints during the last year among the studied subjects.

Musculoskeletal complaints	Result	No (%)
Workers complaining of MSS	Yes NO	171(94.0%) 11(6.0%)
Lower back pain	Yes NO	142(78%) 40(22%)
Neck pain	Yes NO	124(68.1%) 58(31.9%)
Upper musculoskeletal complaint	Yes NO	112(61.5%) 70(38.5%)
Shoulder pain	Yes NO	112(61.5%) 70(38.5%)
Elbow pain	Yes NO	34(18.7%) 148(81.3%)
Upper arm pain	Yes NO	32(17.6%) 150(82.4%)
Lower arm pain	Yes NO	108(59.3%) 74(40.7%)
Wrists complaint	Yes NO	89(48.9%) 93(51.1%)
Hand pain	Yes NO	105(57.7%) 77(42.3%)
Finger stiffness	Yes :- continuous -disappears by rest NO	105(57.7%) 23(12.6%) 54(29.7%)
Finger tingling and numbness	Yes : -continuous -disappears by rest NO	96(52.7%) 9(4.9%) 77(42.4%)
Hand swelling	Yes :- permanent -disappears by rest NO	17(9.3%) 9(4.9%) 156(85.8%)
Upper musculoskeletal weakness	Yes : -permanent -disappears by rest NO	8(4.4%) 104(57.1%) 70(38.5%)

MSS: Musculoskeletal symptoms

Table 2 showed that the most frequent complaints reported by the studied subjects during the past year were lower back pain (78%), followed by neck complaints (68.1%), then upper musculoskeletal complaints (61.5%).

Table (3): Association of low back pain and possible risk factors reported by the studied subjects.

Risk factors	Low back pain		χ^2 (DF)[a] p- value
	Yes	No	
Breaks every 2 hours			
Yes	45(69.2%)	20(30.8%)	4.5(1)
NO	97(82.9%)	20(17.1%)	**0.03***
Duration of computer use			
<2 hours	17 (100%)	0(0%)	5.9(2) 0.05
2-4 hours	43(79.6%)	11(20.4%)	
>4 hours	82(73.9%)	29(26.1%)	
Repetitive tasks			**Fisher's exact (DF)**
Yes	142(94.7%)	8(5.3%)	137.835(1)
NO	0(0%)	32(100%)	**0.0001****

a :p value was calculated by using chi square test and fisher's exact

*: Statistically significant **: Highly statistically significant

Table 3 showed that there was a statistically significant association between not taking breaks, doing repetitive tasks and lower back pain complaint (0.03 and $p<0.001$, respectively).

Table (4): Correlation between various possible risk factors and upper musculoskeletal complaints reported by the studied subjects.

Risk factors	Upper musculoskeletal complaints Spearman's rho	
	r	p value
Repetitive tasks	0.58	**0.0001****
Long period in same position	0.30	**0.0001****
Hand straightness with arm	0.95	**0.0001****
Arm support	-0.72	**0.0001****
Keyboard placed directly in front of the users	-0.95	**0.0001****

**: Highly statistically significant

Table 4 showed that there was a highly statistically significant positive correlations (p=0.0001) between upper musculoskeletal complaints and repetitive task work, being in the same position for long periods and hand straightness with the arm (r = 0.58, 0.30 and 0.95, respectively). Also, there was statistically significant negative correlation between upper musculoskeletal complaints and arm support and key board placed directly in front of the computer user.

Table (5): Multiple logistic regression analysis of risk factors predicting occurrence of upper musculoskeletal complaints among studied subjects.

Risk factors	OR	95% CI	p
Age (years)	1.05	0.384-2.88	0.9
Period of working (years)	1.08	0.420-2.799	0.8
Awkward posture	8.01	0.000-16.78	1
Hand straightness with arm	8.75	0.000-24.87	0.9

N.B. the dependant variable is upper musculoskeletal complaints.

OR: odds ratio; CI: Confidence Interval. R2= 0.635

Table 5 showed that multiple logistic regression model had higher odds ratio for hand straightness with arm, awkward posture, period of working and age (OR = 8.75, 8.01, 1.08 and 1.05 respectively) but these findings was not statistically significant.

Discussion

The current study showed that the last year prevalence rate of MSS among the studied group was (94%) (Table 2). Our results are close to that of Fagarasanu (2006) who detected that (95%) of computer users reported work-related MSS.

Other studies, however, reported lower prevalence rates of work-related MSS among computer users. Sethi et al. (2011) reported a maximum of 60% prevalence rate. Also, a study done in the Netherlands by Bongers et al. (2006) in 2002 and 2004 reported that 28% MSS among computer users during the previous one year.

The present study showed that low back pain was the highest complaint in the last year among computer users (78%) (Table 2). This is in agreement with the work of Chodhury et al. (2014) which was done among 100 computer office workers in Bangladesh and they detected that 91.1% of computer users were complaining of low back pain which is considered as the highest musculoskeletal symptoms (MSS) among their studied group.

Our study showed that 68.1% of computer users were complaining of neck pain and 61.5% of upper musculoskeletal complaints, the rest of body parts were in descending order: shoulder, lower arms, hands, wrists, elbows and upper arms (Table 2). Several studies pointed that the neck and shoulder complaints had higher prevalence rates (with the exception of the back problems) compared to other body regions. Wu et al. (2012) in a study of 720 office workers in China, reported a one year MSS prevalence of 55.5% in the neck, and 50.7% in the shoulders, the prevalence rate in the wrist/hand, upper back and lower back were 31.5%, 26.2% and 6.6%, respectively.

The higher prevalence of the neck and shoulder complaints was also confirmed by Ranasinghe et al. (2011) in their study on 2500 computer workers in Sri Lanka who reported that the one year prevalence of the neck and shoulder complaints was higher than the prevalence of the hand, arm and elbow complaints. Moreover, a cross-sectional study done on 95 employees in the Egyptian Telecommunications Company in Mansoura detected that

the neck/shoulder region was the most commonly affected body region (26.3%) (El-Bestar et al., 2011). A high prevalence of neck/shoulder MSS was also found by Fagarasanu (2006), and a high prevalence of neck complaint was confirmed by Sillanpaa et al. (2003).

Chowdhury et al. (2014) stated that neck complaints were detected in 57.4% of their study group while shoulder complaints were representing 53.5%. Furthermore, a study done in the Netherlands showed that the prevalence of neck and shoulder complaints was 33% and 31%, respectively (Eltayeb et al., 2009).

In contrast to our work, Basu et al. (2014), in a study of 206 employees in a software company in Kolkata reported that the most commonly affected parts of the body with MSS were the fingers (67.5%), the wrists (58.7%), the neck (54.4%) and the elbows (53.3%).

The current study showed that there was a statistically significant association between not taking breaks, doing repetitive tasks and lower back pain complaint (Table 3). This was in agreement with Peter et al. (2016) who found that frequent rest breaks (5 min of standing rest every 30 minute or 50 second of standing rest every 5 min), might help to reduce fatigue and to reduce symptoms of low back pain. Masabumi et al. (2000), in a study carried out among truck drivers in Japan, stated that irregular duty time, short resting time, long driving time in a day were significantly related factors with low back pain.

Our study showed that there were positive correlations between upper musculoskeletal complaints on one hand and repetitive task work, being in the same position for long periods without breaks and hand straightness with the arm on the other hand; also significant negative correlations were detected between upper musculoskeletal complaints and key board placed directly in front of the computer user and arm support (Table 4). These findings were similar to the results of the study done by Celik et al., 2018, who detected that the most harmful effects on musculoskeletal system were sitting at the desk for a long time without a break, sitting on a chair that supported only the arms, and working holding both forearms above the level of the desk.

Conclusion and recommendations: In this study there was a high prevalence of musculoskeletal symptoms especially in the lower back, upper musculoskeletal region, and the neck among computer office workers. Musculoskeletal disorders (MSDs) were significantly associated with unsuitable work conditions, therefore, health education is recommended about the health hazards of computer use, learning how to avoid any adverse health effects and designing a better workplace suitable for use without causing any injury to the musculoskeletal system.

Conflict of interests

The authors declared that there are no competing interests.

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