Prevalence and associated factors related to arm, neck and shoulder complaints in a selected sample of computer office workers

Original Article

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ABSTRACT

Background: Globally, there is an expansion in computer-related work, which may have contributed to an increased burden of complaints of the arm, neck and/or shoulder (CANS). The study was conducted to determine the prevalence and factors associated with CANS among computer office workers (OWs) in Alexandria.

Participants and Methods: Computer OWs at four banks and two telecommunication companies (n=211) were included in a cross-sectional study in 2016. Data were collected using the self-administered Musculoskeletal Upper Extremity Questionnaire-Arabic version. Potentially related factors were examined using bivariate and multivariate analyses.

Results: The sample comprised 95 (45.02%) males and 116 (54.97%) females. Overall, 72% aged 25–35 years. Prevalence with 95% confidence interval (CI) for CANS was 0.73 (95% CI: 0.66–0.79), 0.69 (95% CI: 0.62–0.75) and 0.70 (95% CI: 0.64–0.76), respectively. The majority of the complaints were minor (86%). Factors significantly associated with neck complaints were female sex (P=0.03), inappropriate office equipment (P=0.02), task complexity (P<0.01), break autonomy (P=0.02) and low decision authority (P=0.05). Factors significantly associated with arm/hand complaints were female sex (P=0.01), awkward body posture (P=0.05), break autonomy (P<0.01) and low break quality (P=0.04)

Conclusion: The study revealed high prevalence of CANS and highlighted associated factors, namely, task complexity, inappropriate office equipment, low decision authority, low break quality and female sex. Improving ergonomic conditions, reducing job demands, and increasing job control are crucial to reduce CANS among computer OWs.

Received: 27 July 2017, **Accepted:** 20 October 2017

Key Words: Complaints, factors, neck, prevalence, workers

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Journal of the Egyptian Public Health Association, ISSN: 0013-2446, Vol. 92, No.4

INTRODUCTION

Complaints of arm, neck and/or shoulder (CANS) are defined as musculoskeletal complaints of arm, neck, and/or shoulder not caused by acute trauma or by any systemic disease [1,2]. A computer office worker (OW) is a person whose job tasks include typing or filing documents, correspondence, reports, statements and other materials; most of the tasks involve using a computer [3]. In office, workstation is usually equipped with chair, table, computer, telephone and other equipment [4]. Computer OW is one of the occupations that can potentially be affected by CANS [5,6].

Globally, there is an expansion in computer-related work [5], which may have contributed to an increased burden of CANS [7]. Workers may experience severe debilitating symptoms such as pain, numbness and tingling [8]. CANS were recognized about three decades back as a major cause of work-related inefficiency [9], absenteeism, lower level of performance and productivity, poor quality of life and rising medical costs [10]. In developing countries, workers' suffering would be great, as only 5–10% of workers have access to occupational health services [11].

Prevalence of CANS among computer OWs varies in studies. Some studies reported low prevalence (28, 31, and 35.8%) [2,12,13]. On the contrary, a relatively higher prevalence was reported in other studies (45, 53, 53.6, 54, and 56.9%) [3,5,7,8,9]. The highest percentage of CANS was reported in the neck region followed by shoulder [5,9,14]; however, the opposite has also been reported [13].

Many factors were reported to cause CANS [13]; however, varying results were found in several studies. Poor ergonomic conditions at workstations such as inappropriate workplace design [8,13,15–18], static and/or irregular body postures and repetitive tasks were reported to cause CANS [13,18]. Moreover, psychosocial factors, such as high quantitative and/or qualitative job demands, low job control and limited social and coworker support were significantly related to CANS [13,19,20]. In addition, increase in the number of working hours/day, inability to use break after work with computer and lack of awareness about computer ergonomics were significantly associated with development of CANS [3,8,12,13].

Employment of computer and information technology occupations are projected to grow faster than the average

 DOI: 10.21608/EPX.2018.22041

for all occupations from 2014 to 2024 [21]. Therefore, defining an etiological model that prioritizes modifiable factors is crucial to design evidence-based preventive strategies aiming at reducing CANS in the following years [3].

Studies showed varied results regarding prevalence and risk factors for CANS. Most of the studies were conducted in Europe and Asia [3,7,8,12,13,15], whereas limited data are available about Africa [5,22]. The present study was conducted to determine the prevalence and factors associated with CANS among working population. The specific objectives of the study were as follows: (a) to determine the prevalence rate of CANS in a selected sample of computer OWs; (b) to describe the nature, severity and distribution of CANS by anatomical localization; and (c) to identify factors associated with CANS.

PARTICIPANTS AND METHODS

Study design and Sampling

A cross-sectional approach was used from the beginning of September 2016 to the end of December 2016 on a convenient sample comprising four banks and two telecommunication companies in Alexandria. All registered computer OWs (n=258) were invited to participate. Workers were excluded if they had duration of employment of less than 6 months. All participants performed computer tasks at their work, such as typing, filing documents, data entry and other administrative tasks. The response rate was 81.78%.

Study tool

The Musculoskeletal Upper Extremity Questionnaire (MUEQ) [3,7], a validated screening tool, was used to assess occurrence of CANS and work-related physical and psychosocial factors. Psychosocial factors measured in MUEQ are derived from Job Demand-Control-Model, which assumes that psychological strain results from a joint effect of level of job demands and job control [23,24].

The self-administered MUEQ-Arabic version was distributed among OWs by handing them out at their workplace. Workers were asked to fill out and return the questionnaires within 2 weeks. The returned questionnaires were checked for completeness.

Musculoskeletal Upper Extremity Questionnaire-Arabic version

It comprised 107 items derived from MUEQ-Dutch version that was developed in 1999, and it was found to be valid and reliable [7]. It has been translated to Arabic language, validated for the Arab population; it showed satisfactorily psychometric properties to be used among Arabian Computer OWs [5].

MUEQ was used to collect data about the following: (a) characteristics of the study population, including age, sex, number of working hours with computer/day and number of working years in the current position; (b) prevalence of CANS: the outcome variable was presence of complaint (yes/no) for each body region (neck, shoulder and arm/hand) lasting for at least 1 week over the past 12 months, where cases with pain complaint were classified as severe cases if pain persists even after a short rest period; (c) six main scales of MUEQ to assess work-related physical and psychosocial factors, including work station (six items), body posture (10 items), break time (nine items), job control (nine items), job demands (six items) and social support (12 items); (d) frequency and nature of complaints; and (e) Clinical manifestations, for example, continuous pain, tingling, numbness, stiffness, fatigue, and change in skin color. Items were scored on either yes/no dichotomous scale or a five-point scale (always-often-sometimes-seldom-rare). A Cronbach's α and values of item-total correlations were calculated for each scale in MUEQ-Arabic version [5].

Each item of all scales (except work station scale) was scored on a five-point scale (always-often-sometimes-seldom-rare representing 5–4–3–2–1, respectively); however, in certain items where the sentence was negatively phrased, a reverse score was considered (1–2–3–4–5, respectively). Regarding workstation scale, each item of its two subscales was scored on a (yes-no) dichotomous scale (0–2, respectively) to enter the logistic regression model as 'inappropriate office equipment' and inappropriate computer position'.

The scales for assessing the work-related physical and psychosocial factors

The workstation scale included two subscales. The first subscale determines worker's perception of office equipment (four items, range: 0–8 points). Participants were asked about desk position, using chair that supports lower back, using document keeper to fix documents during printing, and having enough space to work on the desk. The second subscale determines computer position (two items, range: 0–4). Participants were asked about keyboard position, and sitting in a straight horizontal position in front of the screen.

The body posture scale included two subscales. The first subscale determines head and body posture (six items, range: 6–30). Participants were asked about having physically exhausting job, placing hand in a straight line with lower arm during keying, head position (bended or twisted towards the left or right side), and trunk position (asymmetrical position, or twisted towards the left or right side). The second subscale determines awkward body posture (four items, range: 4–20). Participants were asked about sitting for long hours in one position, sitting with lifted shoulders for more than 2 h per day, awkward posture, and repetitive tasks (printing).

The break time scale included two subscales. The first subscale determines break autonomy (four items, range: 4–20). Participants were asked about the ability to decide when to take a break, when to start and finish tasks, divide tasks, and sufficiency of break time. The second subscale determines break quality (five items, range: 5–25). Participants were asked about changing body posture, changing tasks, performing certain tasks without computer, taking a 10-min break every 2 h, and spending break time outside office.

The job control scale included two subscales. The first subscale determines skills discretion (six items, range: 6–30). Participants were asked about developing abilities, creativity, learning new things and decision making at work. The second subscale determines decision authority (three items, range: 3–15). Participants were asked about the ability to decide how to perform job task and to solve work problems by themselves.

The job demand scale included two subscales. The first subscale determines time pressure (three items, range: 3–15). Participants were asked about difficulty to finish tasks on time and taking extra working hours. The second subscale determines task complexity (three items, range: 3–15). Participants were asked about working pressure, difficult tasks, and speeding at work to finish tasks.

The social support scale included two subscales. The first subscale determines relationship among coworkers and between workers and supervisors (seven items, range: 7–35). Participants were asked about supervisor's support, positive evaluation from colleagues, and emotional support for personal issues. The second subscale determines work flow (five items, range: 5–25). Participants were asked about work flow, ability to ask and enquire, depending on colleagues to perform tasks and comfortable work atmosphere.

Statistical analysis

Data were analyzed using Stata statistical software, version 14 (Stata Corp LP, College Station, Texas, USA). Frequency, percentages, mean, and SD were calculated to describe the study population. Prevalence of complaints was calculated including 95% confidence interval (CI) for each body region and in combinations of regions. Percentages of complaints with respect to anatomical localization (right side, left side, or both) were demonstrated.

Association between each potential factor and outcome variable was examined separately for neck, shoulder and arm/hand complaints using bivariate analysis. In addition, multivariate analysis using logistic regression was performed including all potential factors to determine the factors significantly associated with CANS. Associations were considered statistically significant if P up to 0.05. The explained variance of logistic regression model was calculated by means of Nagelkerke's R2 and the goodness of fit by means of the Hosmer and Lemeshow goodness-of fit test.

Ethical considerations

The study was approved by the Research Ethics Committee at the Alexandria Faculty of Medicine. Objectives, procedures, types of information to be obtained and the expected benefits of publication of results were explained to participants. An informed consent was obtained from each participant. Collected data were confidentially kept.

RESULTS

The study population (n=211; response rate=81.78%) comprised 95 (45%) males and 116 (54.9%) females. Overall, 28% of the study population had number of working hours/day of more than 8 h and 55.9% have been working in the current position for more than 4 years. More than half of participants worked with computer for 6–8 h/day (54.5%) (Table 1). The mean duration of employment and mean computer working hours/day were significantly higher among males (9.67±7.85 years and 7.81±2.61 h) compared with females (6.99±6.00 years and 5.97±2.12 h, respectively) (t=2.80, P<0.01; and t=5.61, P<0.01 respectively) (data not shown).

Prevalence of complaints of the arm, neck and/or shoulder

The prevalence of neck complaints was 0.69 (95% CI: 0.62–0.75), shoulder 0.70 (95% CI: 0.64–0.76), and arm/hand 0.73 (95% CI: 0.66–0.79) (Table 2). The prevalence of CANS was significantly higher among females (0.76, 0.76 and 0.81, respectively) compared with males (0.60, 0.63 and 0.63, respectively) (P<0.01, 0.03 and 0.01, respectively).

Overall, 54% of the study population reported symptoms of whole upper musculoskeletal extremity. The prevalence of severe cases was 0.14 (95% CI: 0.08–0.19), of whom 57.89% were females (Table 2). In general, right side complaints were more frequently reported than left side (Table 3).

Factors associated with neck complaints

In multivariate analysis, factors significantly associated with neck complaints were female sex [odds ratio (OR) 2.4; 95% CI: 1.09–5.39; P=0.03], appropriateness of the office equipment (OR 6.4; 95% CI: 1.31–31.4; P=0.02), task complexity (OR 16.9; 95% CI: 3.2–89.15, P<0.01), decision authority (OR 0.1; 95% CI: 0.02–1.06; P=0.05), break autonomy (OR 2.6; 95% CI: 1.13–5.97; P=0.02) and working years in the current position (OR 1.0; 95% CI: 1.00–1.13; P=0.02). The logistic regression model was significant ($\chi 2$=49.12, P<0.01). The Nagelkerke's R2 was 0.31, and the Hosmer–Lemeshow goodness-of-fit test was not significant ($\chi 2$=14.44, P=0.07) (Table 4).

Factors associated with shoulder complaints

Results of bivariate analyses indicated a significant association between shoulder complaints and sex (OR 1.9; 95% CI: 1.05–3.50; P=0.03), time pressure (OR 2.7, 95% CI: 1.46–5.10; P<0.01), and task complexity (OR 2.6; 95% CI: 0.98–6.9; P=0.05). However, the logistic regression model was not significant ($\chi2$=24.24, P=0.06) (data not shown).

Factors associated with arm/hand complaints

In multivariate analysis, factors significantly associated with arm/hand complaints were female sex (OR 2.8; 95% CI: 1.21–6.69; P=0.01), awkward body posture (OR 6.2; 95% CI: 0.98–39.22; P=0.05), break autonomy (OR 3.2; 95% CI: 1.34–7.94; P<0.01), break quality (OR 0.1, 95% CI: 0.01–0.94; P=0.04) and duration of employment in the current position (OR 1.1; 95% CI: 1.00–1.12; P=0.03). The logistic regression model was significant ($\chi2$=50.70, P<0.01). The Nagelkerke's R2 was 0.33, and the Hosmer–Lemeshow goodness-of-fit test was not significant ($\chi2$=4.83, P=0.77) (Table 5).

Table 1 Characteristics of the sample of computer office workers, Alexandria, Egypt, 2016

Characteristics	Total (n=211) [n (%)]	Male (n=95) [n (%)]	Female (n=116)
Age (years)[a]			
25–35	153 (72.5)	60 (63.2)	93 (80.2)
36–45	39 (18.5)	23 (24.2)	16 (13.8)
>45	19 (9.0)	12 (12.6)	7 (6.0)
Number of working (h/day)			
4–7	94 (44.5)	20 (21.1)	74 (63.8)
8	58 (27.5)	29 (30.5)	29 (25.0)
>8	59 (28.0)	46 (48.4)	13 (11.2)
Mean±SD	8.2±2.7	9.6±3.1	7.0±1.5
Number of working hours with computer/day			
<3	8 (3.8)	0 (0.00)	8 (6.9)
3–5	51 (24.2)	17 (17.9)	34 (29.3)
6–8	115 (54.5)	54 (56.8)	61 (52.6)
>8	37 (17.5)	24 (25.3)	13 (11.2)
Mean±SD	6.8±2.5	7.8±2.6	5.9±2.1
Duration of employment in current position (years)			
2–4	93 (44.1)	33 (34.7)	60 (51.7)
>4	118 (55.9)	62 (65.3)	56 (48.3)
Mean±SD	8.2±7.0	9.6±7.8	6.9±6.0

[a]In MUEQ-Arabic version questionnaire, age is a categorical variable; the question to obtain data on age had three choices (the exact age of the participant was not written in the questionnaire). So it would not be possible to calculate mean and SD for age variable.

Table 2 Prevalence rate of complaints of the arm, neck and/or shoulder lasting for at least 1 week during the previous 12 months among computer OWs, Alexandria, Egypt, 2016

		Prevalence (95% CI)		
Complaints	**N**	**Total (n=211)**	**Male (n=95)**	**Female (n=116)**
Body region				
Neck	146	0.69 (0.62–0.75)	0.60 (0.49–0.70)a	0.76 (0.68–0.84)[a]
Shoulder	149	0.70 (0.64–0.76)	0.63 (0.53–0.73)a	0.76 (0.68–0.84)[a]
Arm/hand[b]	154	0.73 (0.66–0.79)	0.63 (0.53–0.73)a	0.81 (0.73–0.88)[a]
Complaints in combined body regions				
Neck and shoulder symptoms	9	0.04 (0.01–0.07)	0.06 (0.01–0.11)	0.02 (0.00–0.05)
Neck and arm/handb symptoms	13	0.06 (0.02–0.09)	0.07 (0.02–0.12)	0.05 (0.01–0.09)
Shoulder and arm/handb symptoms	21	0.10 (0.05–0.14)	0.10 (0.04–0.16)	0.09 (0.04–0.14)
Neck, shoulder and arm/handb symptoms	114	0.54 (0.47–0.60)	0.42 (0.31–0.52)	0.63 (0.54–0.72)
Severity of pain among cases[c]				
		n=136	n=52	n=84
Mild cases[d]	117	0.86 (0.80–0.91)	0.84 (0.74–0.94)	0.86 (0.79–0.94)
Sever cases[e]	19	0.14 (0.08–0.19)	0.15 (0.05–0.25)	0.13 (0.05–0.20)

CANS, complaints of arm, neck and shoulder; CI, confidence interval; OWs, office workers.
[a]The prevalence of CANS was significantly higher among females (0.81, 0.76, 0.76, and 0.81, respectively) compared with males (0.63, 0.60, and 0.63, respectively) (P<0.01, P=0.03 and P<0.01, respectively).
[b]Upper arm, elbow, lower arm, wrist, or hand complaints.
[c]Cases with pain in the upper musculoskeletal extremity.
[d]Pain disappears after short period of rest.
[e]Pain persists even after short period of rest.

Table 3 Frequency of complaints[a] in upper musculoskeletal extremity distributed by anatomical localization and sex among computer office workers, Alexandria, Egypt, 2016

	Anatomical localization					
Sex and body side	Shoulder	Upper arm	Elbow	Lower arm	Wrist	Hand
All (n)	149	123	91	88	91	104
Right side	36.2	41.5	46.1	46.6	46.2	52
Left side	10.1	8.9	4.4	1.1	3.3	3.8
Both sides	53.7	49.6	49.5	52.3	50.5	44.2
Male (n)	60	46	35	27	31	38
Right side	40	45.7	48.6	55.6	41.9	52.6
Left side	15	15.2	5.7	0.00	6.5	5.3
Both sides	45	39.1	45.7	44.4	51.6	42.1
Female (n)	89	77	56	61	60	66
Right side	33.7	39	44.6	41	48.3	51.5
Left side	6.7	5.2	5.4	1.6	1.7	3
Both sides	59.6	55.8	50	57.4	50	45.5

[a]Complaints lasting for at least 1 week during the previous 12 months.

Table 4 Factors associated with neck complaints

	Bivariate analysis		Multivariate analysis[a]	
Risk factors	**ORb (95% CI)**	**P-value**	**Adjusted OR[b] (95% CI)**	**P-value**
Sex (female)[c]	2.1 (1.21–3.98)	<0.01	2.4 (1.09–5.39)	0.03
Working years in current position	1.0 (0.98–1.08)	0.14	1.0 (1.00–1.13)	0.02
Computer working (h/day)	1.0 (0.90–1.13)	0.84	1.0 (0.90–1.23)	0.50
Inappropriate office equipment	4.3 (1.25–14.8)	0.02	6.4 (1.31–31.4)	0.02
Inappropriate computer position	1.6 (0.45–6.25)	0.78	0.5 (0.10–3.25)	0.53
Irregular head and body posture	0.9 (0.38–2.51)	0.97	0.4 (0.09–2.10)	0.30
Awkward body posture	2.3 (0.55–9.54)	0.24	1.4 (0.24–9.28)	0.66
Break autonomy	1.9 (1.05–3.65)	0.03	2.6 (1.13–5.97)	0.02
Break quality	2.4 (0.91–6.46)	0.07	1.6 (0.45–6.06)	0.44
Skills discretion	0.7 (0.32–1.54)	0.38	2.1 (0.3–12.07)	0.36
Decision authority	0.3 (0.13–1.00)	0.05	0.1 (0.02–1.06)	0.05
Time pressure	2.5 (1.36–4.70)	<0.01	1.2 (0.50–2.95)	0.65
Task complexity	9.6 (3.04–30.7)	<0.01	16.9 (3.2–89.1)	<0.01
Social support	0.5 (0.18–1.81)	0.34	0.9 (0.17–4.99)	0.94
Work flow	0.3 (0.07–1.49)	0.15	0.7 (0.11–5.69)	0.82
Model $\chi2$=49.12 (<0.01)				

CI, confidence interval; OR, odds ratio.
[a]Multivariate analysis using logistic regression.
[b]Odds ratios. The Nagelkerke's R2=0.31 and the Hosmer–Lemeshow goodness-of-fit test was not significant ($\chi2$=14.44, P=0.07).
[c]Reference is male.

Table 5 Factors associated with arm/hand[a] complaints

	Bivariate analysis		Multivariate analysis[b]	
Risk factors	**ORc (95% CI)**	**P-value**	**Adjusted OR[c] (95% CI)**	**P-value**
Sex (female)[b]	2.4 (1.33–4.65)	<0.01	2.8 (1.21–6.69)	0.01
Working years in the current position	1.03 (0.9–1.09)	0.11	1.1 (1.00–1.12)	0.03
Computer working (h/day)	0.9 (0.85–1.08)	0.57	0.9 (0.85–1.16)	0.99
Inappropriate office equipment	0.9 (0.38–2.22)	0.85	0.8 (0.26–2.93)	0.83
Inappropriate computer position	2.3 (0.50–10.7)	0.28	1.8 (0.27–12.9)	0.51
Irregular head and body posture	2.3 (0.98–5.82)	0.05	1.7 (0.47–6.56)	0.39
Awkward body posture	8.8 (1.73–45.4)	<0.01	6.2 (0.9–39.22)	0.05
Break autonomy	1.7 (0.91–3.29)	0.09	3.2 (1.34–7.94)	<0.01
Break quality	0.5 (0.14–1.84)	0.30	0.1 (0.01–0.94)	0.04
Skills discretion	0.1 (0.51–0.59)	<0.01	0.8 (0.10–6.56)	0.86
Decision authority	0.1 (0.00–0.53)	0.01	0.1 (0.00–1.79)	0.11
Time pressure	3.7 (1.97–7.12)	<0.01	1.8 (0.73–4.41)	0.19
Task complexity	3.8 (1.43–10.3)	<0.01	2.9 (0.7–12.00)	0.14
Social support	0.2 (0.06–1.29)	0.10	0.5 (0.06–3.90)	0.52
Work flow	0.3 (0.08–1.82)	0.23	0.9 (0.11–7.37)	0.95
Model $\chi2$=50.70 (<0.01)				

The Nagelkerke's R2=0.33, and the Hosmer–Lemeshow goodness-of-fit test was not significant ($\chi2$=4.83, P=0.77).
CI, confidence interval; OR, odds ratio.
[a]Upper arm, elbow, lower arm, wrist, or hand complaints.
[b]Reference is male.
[b]Multivariate analysis using logistic regression.
[c]Odds ratios.

DISCUSSION

By 2020, employment in all computer occupations is expected to increase by 22% [21]. Therefore, identifying potential risk factors for CANS would be essential to design preventive strategies [3]. The current study reported high prevalence of CANS among computer OWs compared with other studies [2,12,13], even those conducted in comparable developing countries [5,25–27]. Moreover, in the present study, the prevalence of neck complaints was similar to shoulder complaints and slightly lower than arm/hand complaints. However, some studies reported neck complaints higher than shoulder complaints [5,9,14], and both were much higher than arm/hand complaints [5,13,28]. Studies indicate that globally, CANS are not typical and are multifactorial with possible interactions between different factors.

In the present study, although the mean duration of employment and computer working/day were significantly higher among males compared with females, yet the prevalence of CANS among females was significantly higher than males. In multivariate analysis, female sex was significantly associated with neck and arm/hand complaints. A female computer OW was 2.4 times more likely to have neck complaints and 2.8 times more likely to have arm/hand complaints compared with a male computer OW. Findings of the present study are in total agreement with the results of several studies where the reported upper musculoskeletal complaints among females were significantly higher than males [3,5,13,18,26]. Hooftman et al. [29] mentioned that sex difference might be explained by differences in exposures to work-related factors. Another possible explanation could be vulnerability of females, which makes them more likely than males to have complaints when they are exposed to same work-related factors.

In the current study, most participants were classified as mild cases (severe case were 14%, and mild cases were 86%). This is in line with the study by Eltayeb et al. [5], where only 4% of respondents were classified as severe cases. Moreover, in the study by Kryger et al. [30], only 16 of 296 participants with forearm pain were clinically diagnosed as a forearm case. Furthermore, in the study by Andersen et al. [18], less than 3% of participants reported moderate to severe neck pain. Subjective assessment of severity of pain in the current study might be the reason for the relatively higher severity rate (14%) compared with the results of other studies. Eltayeb et al. [5] mentioned that it would be better to describe the condition as fluctuating daily aches and pain instead of being a health problem that necessitates serious medical attention.

On studying work-related factors in the current study, inappropriate office equipment, low decision authority and task complexity were significantly associated with neck complaints. A computer OW who performed complex tasks was 16.9 more likely to have neck complaints compared with OW who performed simple tasks. Moreover, computer OWs who work in an inappropriate office equipment were 6.4 times more likely to have neck complaints compared with those who had appropriate office equipment. In addition, there is 90% decreased likelihood of neck complaints among computer OW with high decision authority. Findings of the present study are consistent with other studies where inappropriate work station [3] and task difficulty were significant predictors of neck complaints [3,13,24,31]. Moreover, low decision latitude was reported as a significant predictor [3] and suggested as a risk factor for upper extremity musculoskeletal disorders in a systematic review [19].

Furthermore, in the current study, awkward body posture was significantly associated with arm/hand complaints. A computer OW who used to sit in awkward body posture at work was 6.2 times more likely to have arm/hand complaints compared with OW who used to sit in a comfortable position. Similarly, Ranasinghe et al. [3], found that improper body posture was a significant predictor for arm/hand complaints. Remaining seated for long periods at work increases pressure on joints, stresses ligaments and provokes muscle pain [32].

Regarding the association between CANS and break time, in the current study, there was 90% decreased likelihood of arm/hand complaints among computer OWs who had high-quality break. In addition, high level of break autonomy was significantly associated with neck and arm/hand complaints. According to the results of the present study, a computer OW with high level of break autonomy was 2.6 times more likely to have neck complaints and 3.2 times more likely to have arm/hand complaints compared with OW who had low level of break autonomy. Participants in the current research were recruited mainly from private companies where break time is a standard part of the work day. Effectiveness of break time depends on the activity practiced during break such as doing relaxation activities, socializing, or working. Research showed that employees were less fatigued at the end of the day if they had relaxation activities, and more fatigued if they had worked or had social activities during break [33]. Having higher levels of break autonomy does not necessarily mean higher levels of useful relaxation activities. In other words, break time may offer little opportunity for relaxation and greater chance to activities that heighten exhaustion and provoke complaints.

Limitations of the study

Measurement of the ergonomic hazard at workplace was subjective. Actual measurements using, for example, the validated Occupational Safety and Health Administration workstation checklist [34] would give more accurate results. The present study was cross-sectional; however, a prospective cohort study would be better as it has no recall bias and can accurately determine cause-effect relationship.

CONCLUSION AND RECOMMENDATIONS

High prevalence of CANS among computer OWs was reported. Most complaints were mild. Multiple factors in the three main categories (demographic, physical and psychosocial) were involved in occurrence of CANS. The (small) differences in relative importance of different factors, reported also in different studies, might relate to particulars of working population in different countries. Therefore, it is recommended to design preventive strategies according to the significant modifiable factors identified for each specific working population. Prospective cohort studies that accurately examine risk factors for CANS are required in future research.

ACKNOWLEDGEMENTS

The author appreciates cooperation of computer OWs who participated in the study.

Conflicts of interest

Author declares that there is no conflict of interest.

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