Prevalence of complaints of arm, neck and shoulder among computer office workers in Sudan and the validation of an Arabic risk factors questionnaire

Shahla Eltayeb[1, 2], J Bart Staal [1], Amar Hassan[3], Salwa Awad [2], Rob de Bie[1]

[1]Maastricht University, Department of Epidemiology and Caphri Research Institute, Maastricht, the Netherlands

[2] Ahfad University for Women, School of psychology, Omdurman, Sudan

[3] Ahfad University for Women, School of Physiotherapy, Omdurman, Sudan

Correspondence address of first author:

Mrs. Shahla Eltayeb, MSc.

Abstract

Aim

To identify the prevalence of work related Complaints of Arms, Neck and Shoulder (CANS), among computer office workers in Sudan and, to test the psychometric properties of a translated Dutch questionnaire in Arabic language.

Methods

Computer office workers (n = 282) at a mobile telecommunication company and three banks in Khartoum, Sudan received in 2005 an Arabic language version of the validated Maastricht upper extremity questionnaire (MUQE). The questionnaire holds 107 items covering demographic characteristics, in addition to six main domains assessing the potential physical and psychosocial risk factors. Forward/backward translation of the MUQE was done by two different translators. Prevalence rates in the past year were computed for complaints in the arms neck and shoulder. The psychometric properties of the Arabic questionnaire were assessed using exploratory factor analysis, internal consistency and cross validation were tested.

Results

The response rate on the questionnaire was 88% (n=250). The one-year prevalence rate of CANS showed that 53% of the respondents were classified as mild cases. The highest incidences were found for neck and shoulder symptoms (64% and 41% respectively).The analysis of the psychometric properties of the scale resulted in the identification of 6 main scales. The results of the internal consistency and cross validation analysis provided evidence of reliability of the individual scales and lack of redundancy.

Conclusions

The prevalence rate of CANS among the targeted population seems to correspond if not higher with prevalence rates of CANS in other western developed countries. The Arabic translation of the MUEQ has satisfactory psychometric properties to be used to assess work related risk factors for the development of CANS among computer office workers in Sudan.

Introduction

The term CANS describes Complaints of Arm, Neck and/or Shoulder and is defined as "musculoskeletal complaints of arm, neck and/or shoulder not caused by acute trauma or by any systemic disease"[1].

Complaints in the arms neck and shoulders (CANS) in general and computer related disorders in particular affect millions of computer office workers in western developed countries [2]. However, with the wide use of computer systems in the developing countries [3], the associated musculoskeletal complaints are yet to be investigated.

CANS are the leading cause of occupational illness in the United States with related absenteeism and medical expenses costing the industry between $45 to $54 billion annually [4, 5, 6]. Even in the Netherlands, with a working population of 7 million, annual costs for all musculoskeletal disorders are estimated to be 2.1 billion euro [4]. However, very limited data were available about the magnitude of this problem in non-western regions such as Africa [3], if it is a problem, and none so far documented the problem in Sudan.

In general, the clinical, epidemiological and social aspects of CANS remain largely controversial in the medical literature [7]. Nevertheless, CANS have been widely shown to affect a considerable proportion of the adult population and workers in all levels of economic activities. Certain occupational groups have an increased risk of developing upper extremity complaints [7]**.** According to several reviews [8, 5], positive but not conclusive relations have been found between various physical and psychosocial risk factors and the occurrence of CANS .

The intensive use of a mouse or keyboard may give rise to aches and pains in the fingers, hands, wrists, arms or shoulders. Awkward body posture and repetitive movements were the prime culprits in the presence of complaints among other job characteristics such as high job demands, having low job control and low social support [2, 9]. However, the relationships reported in the literature are mostly derived from cross-sectional studies, and mostly in western countries thus causal relations between the above mentioned factors are unclear, necessitating further research [5].

The present study aims to present the prevalence rates of CANS in a Sudanese working population. We also translated a standardized Dutch questionnaire to Arabic to be able to assess the occurrence, nature and the work related physical and psychological risk factors of CANS. Furthermore, in future the study aims to use the validated questionnaire to assess the relationship between the suspected risk factors and CANS among the targeted population.

The psychometric properties of the Dutch questionnaire have already been reported in another paper [10]. The psychometric properties of the Arabic translation are reported in the present paper.

Methods

Study population and data collection

We conducted a cross-sectional study between April and May 2005. The study population consisted of 282 workers who were invited to participate in the study from two different work locations (Telecommunication Company and three banks) in Khartoum, Sudan.

In order to be included office workers had to perform jobs with a variety of (1) computer tasks (i.e. administrative, graphical and data entry tasks) and (2) they should be employed in the current position for at least six months. Participants were excluded on the basis of the following criteria: (1) severe psychiatric or behavioural disorders (requiring treatment in the last 30 days); (2) having had surgery in the upper extremity previously.

The targeted company and the three Banks represent both private and governmental sectors. They all share similar working conditions: i.e. working an average of 8 hours per day; six days per week in the Banks and 5 days per week in the telecommunication company and they share the same labour legislation. This means that they have the right of a 3 month fully paid sick leave after which payment declines by half every three months for a maximum period of one year. In the period that follows the employee receives a disability pension about one third of the original salary (Sudanese labour law 1997). The selected work locations have both modern industrial buildings and the offices have sophisticated lighting, air-conditioning and work stations.

Data were collected with self-administered questionnaires. On the first of April 2005 the questionnaires were distributed among the participants by handing them out at the workplace. Participants were asked to fill out the questionnaire and return it using

special provided boxes. By mid April a reminder note was posted to non-responders, and the end of April 2005 was set as the latest return date. Completed and returned questionnaires were coded and entered in the SPSS 11.0 software program and data were cleaned and made ready for statistical analysis.

We obtained ethical approval of the Ahfad University medical ethical review board for the data collection.

The questionnaire

Items included in the questionnaire were taken from the Maastricht Upper Extremity Questionnaire (MUEQ) which was developed in 1999. The psychometric properties of the Dutch version of this questionnaire have been investigated and it was found to be valid and reliable [10]. The MUEQ is a screening instrument that allows assessment of the prevalence of CANS and risk factors for the development of these complaints

The MUEQ was translated into Arabic language (the standard written Arabic in the Arab world) with a forward and backward translation procedure [11-14]. Two bilingual translators (Dutch-Arabic) separately translated the original scale once. They were encouraged to strive for idiomatic rather than word-for-word translation. The Arabic version was then reviewed by several Sudanese experts consisting of an orthopaedic surgeon, psychologist, one physiotherapist, a statistician and an Arabic linguist to assess the necessity of performing a cultural adaptation and to fine-tune it for use among Sudanese workers. A backward translation of the reviewed version was then translated into Dutch, to verify that the meaning of each item of the scale was preserved.

The Arabic version consists of six pages with 107 questions and has a completion time of approximately 30 minutes. The Arabic questionnaire covers demographical information of the subjects under study in addition to seven main domains as in the MUEQ. These were the following domains: (1) work station; (2) posture during work; (3) quality of break time; (4) quality of work environment (5) job demands; (6) job control, and (7) social support. A couple of questions assessed the worker's work environment and the frequency and nature of upper extremity complaints (i.e. the presence of complaints in the neck, shoulder, upper and lower arm, elbow, hand and wrist). Further questions specified the clinical manifestations of the complaint (i.e. tingling, numbness, weakness, swelling, stiffness, fatigue, continuous pain and change in skin colour or temperature). All items were rephrased as statements in either a five point scale (completely true-completely false) and (always-never) or a dichotomous statement (yes-no). A body mannequin was added to the Arabic version to illustrate the upper extremity anatomical areas. The Arabic questionnaire is presented in Appendix 1. The original Dutch questionnaire and a translated English version have been presented in a separate paper [10].

Calculation of prevalence rates

The prevalence rates of complaints over the past twelve months that lasted for at least one week for each upper musculoskeletal body region (neck, shoulder, arm, elbow, hand and wrist) were computed including 95% confidence intervals (CI).

Further participants who reported complaints in the upper extremity were classified into two groups: (1) mild cases: subjects who reported pain or/and complaints in one or more of the body regions neck, shoulder, hand, wrist and elbows for at least seven days during the preceding 12 months; (2) severe cases: subjects who reported pain

or/and complaints in one or more of the body regions neck, shoulder, hand, wrist and elbows for at least seven days during the preceding 12 months and the pain was chronic and present even after a short rest. Prevalence rates of complaints for mild and severe cases for the past twelve months were computed for males and females including 95% confidence intervals.

Factor Analysis

The responses on various questions were conducted using Principal Component Analysis (PCA) with Varimax rotation. Independent factors were considered as meaningful when they appeared before the break in the Scree plot results. As for factor loading after the Varimax rotation, items with a factor loading less then 0.5 on all factors were excluded, unless they represent an essential assumption. Further, each factor had to be comprised of at least three items. If the results indicated more than two factors then a forced two factor analysis was performed [15].

Reliability and internal consistency of the questionnaire

We investigated the internal consistency by calculating Cronbach's α for each scale and by calculating item-total correlations. An alpha greater than 0.70 was considered acceptable; and Optimal item-total correlation was considered to be between 0.2 and 0.5 [16].

Performance of cross-validation

In order to test the stability of the factor structure cross-validation was carried out. Cross-validation, is the statistical practice of partitioning a sample of data into subsets such that the analysis is initially performed on a single subset, while the other subset(s) are retained for subsequent use in confirming and validating the initial

analysis [16, 17]. The initial subset is called the training set; the other subset(s) are called validation or testing sets. The sub-sample was randomly selected from the study population and the comparison was made.

Results

Demographic characteristics of the study population

TABLE 1 ABOUT HERE

Two hundred and fifty men and women out of the 282 responded to the baseline questionnaire which resulted in a response rate of 88%. Sixty five per cent (n= 163) of our subjects were men.

76% of male respondents age 25-35 compared to 87% females. The proportion of men working 6-8 hours per day with a computer was 59% compared to 65% of the women. Fifty eight per cent of the women worked between 2 and 4 years in their current position compared to 47% of the men population (Table 1).

TABLE 2 AND 3 ABOUT HERE

FIGURE 1 ABOUT HERE

Prevalence rates of CANS

The 12-month prevalence of reported complaint cases including 95% confidence intervals are presented in table 2. The most commonly reported complaints were neck and shoulder symptoms (64% and 41% respectively), followed by upper arm, hand and wrist complaints (32%, 30% and 29%) and lower arm and elbow complaints (21% and 19%). Fifty-three percent of the respondents were mild cases, of whom 51% were male. The total percentages of severe cases were 9% of whom 66% were females.

Further, statistical significant ($p<.05$) differences were found between men and women in the reporting of complaints among the various upper extremity anatomical areas (except for neck pain) with females reporting higher percentages (figure 1) (Table 2).

The distribution of the complaints by anatomical locality (i.e. left side, right side and both sides) classified by gender is presented in table 3. Results indicated that for the wrist and hand complaints "right side" complaint were reported more frequently than "left side" complaint or "both sides" complaints. Contrary to this, shoulder and elbow complaints have been reported more frequently to appear on "both sides".

TABLE 4 ABOUT HERE

TABLE 5 ABOUT HERE

TABLE 6 ABOUT HERE

Psychometric characteristics of the questionnaire

Because the social and environmental conditions in Sudan vary from those in Western European and North American countries, a simple translation was not suitable. Thus, the investigators added some new questions. Seven items were added (56, 59, 71, 74, 75, 76 and 106; see appendix 1) so as to be in keeping with the Sudanese work setting, environment and to tackle some aspects that are commoner to be performed by the Sudanese workers for example to have the breakfast break at the office, and mostly delivered to the office

Results of the cross-validation

We found that the number of factors, the factor structure and factors loadings were for the greater part comparable between the first randomly created sub-sample and the total sample. Difference was found in the (quality of break) domains, items related to autonomy scale "I can divide my work tasks", "I find my work breaks sufficient", "I can decide when to take a break" and "I can decide when to start and to stop" load positively in the first factor in the created sub sample; however, the same items loads highly in second factor in the total sample analysis. Since no important differences were found in the results therefore we only present the results of the factor analyses as applied to the randomly created first sub sample.

Work station

The first group of items addressed the work station (i.e. table, chair and computer placement) and consisted of a total number of eight items. Three factors were extracted (data not shown) therefore, we undertook a forced two-factor solution. The rotated factor loadings of these analyses are shown in table 3. Examination of the factor loadings showed that two items ‘‘I can adjust my chair height’’ and ‘‘when I use the mouse device my hand is straight” load poorly (>0.5) on both factors. They were therefore excluded. As for the first factor it held four items and this accounted for 21.5% of the total variance. (a) ‘‘my desk (table) at work has suitable height’’; (b) “I have enough space to work at my office”; (c) “the chair I use during work support my lower back” and (d) “I have a file holder I use when I am typing”. Thus, the first factor is related to the office equipment accounted for 21.5% of the total variance. This subscale had a low Cronbach’s alpha of 0.50 which is below the accepted norm of 0.70 [16] and the values of item-total correlations varied between 0.23 and 0.35. The second factor included two items: (e) “my keyboard is placed directly in front of me”, and (f) “I can sit straight in front of the computer screen”. They were related to the computer position and this accounted for 17.9% of the total variance. This subscale holds less than three items and had a low Cronbach’s *a* 0.48 and the item-total correlation were 0.36.

Body Posture

The second domain addressed body posture and consisted of 11 items. Two factors were extracted Scree plot and examination of the rotated factor loadings showed that two items "I find my job physically exhausting" and "during my work I use foot supporter" load poorly on both factors justifying deletion of these two items. As for

the first factors, it included five items related to “head and body posture” and this accounted for 24.0% of the total variance. The scale had a Cronbach’s alpha of 0.88, and the item-total correlation ranged from 0.57 to 0.90 (Table 4 and 5). The second factor included three items related to “awkward body posture” (i.e. (a) “during my work I sit for long hours in one position”, (b) “for more than two hours per day I work with lifted shoulders”, (c) "my work requires performing repetitive tasks" and (d) "during my work I sit in awkward posture" and this accounted for 17.5% of the total variance. Cronbach’s alpha was 0.66 and the item-total correlation of this subscale ranged form 0.40 to 0.96.

Break Time

Break time during working hours was investigated by a total number of 9 items. The Scree plot results identified two factors and examination of the rotated factor loadings showed that, the first factor holds five items which made the “break quality” scale and this accounted for 62.2% of the total variance (Table 3). Cronbach’s alpha was 0.79 and the item-total correlations of the “break quality” scale ranged from 0.38 to 0.64. Four items related to the “autonomy” load highly on the second factor, accounting for 15.9% of the total variance, with a Cronbach’s alpha of 0.53 and item-total correlations ranging from 0.19 to 0.53.

Job Control

The job control domain included 9 items. The Scree plot results identified two factors. The rotated factor loadings indicated that the first factors “skill discretion” contained six items. This accounted for 48.7% of the total variance with a Cronbach’s alpha of 0.84 and item-total correlations ranging from 0.41 to 0.72. The second factor “decision authority” contained three items: (a) “I decide how to perform my job task”, (b) “I determine the time and speed of job tasks” and (c) “I

solve work problems by myself". This accounted for 12% of the total variance. Cronbach's alpha was 0.76 and the item-total correlations ranged from 0.44 to 0.53 (Table 4 and 5)

Job Demands

The domain job demands consisted of a total of 7 items. The Scree plot results identified two factors examination of the rotated factor loading showed that one item "I have too many job tasks" loads poorly (<0.5) on both factors, hence it was deleted. The first factor (time pressure) included three items (a) "difficulty to finish my job tasks" (b) "regular over times" and (c) "limited time to finish my job". This accounted for 33.7% of the total variance, Cronbach's alpha was 0.71 and the item-total correlations ranged from 0.12 to 0.30 (Table 5). The second factor (i.e. task complexity) held three items: (a) "I work with maximum speed to finish my tasks", (b) "I work under extensive pressure" and (c) "I find my work tasks difficult". These items accounted for 16.1% of the total variance and Cronbach's alpha was 0.53. Item-total correlations ranged from 0.49 to 0.56 (Table 5).

Social Support

Twelve items investigated the relationship among co-workers and between workers and supervisors. The Scree plot indicated that two factors were to be retained. The rotated factor loadings indicated that seven items load highly on the first factor "social support" and this accounted for 53.2% of the total variance. Cronbach's alpha was 0.94 and item-total correlations of "social support" ranged from 0.85 to 0.88. The other five items were classified as the "work flow" and accounted for 35.8% of the total variance. Cronbach's alpha was 0.76 and item-total correlations ranged from 0.71 to 0.97 (Table 4 and 5).

Discussion

This is the first study investigating the prevalence of complaints in the am neck and shoulder in a population of computer office workers in Sudan. We assessed the 12–months prevalence of CANS, using an Arabic version of an existing comprehensive and validated questionnaire (MUEQ) that included various scales, which measure potential work related risk factors for CANS.

The prevalence of neck and shoulder complaints in the study population was higher than the prevalence of arm, hand and elbow complaints. Since there are no figures documenting previous prevalence rates of CANS in Sudan, the study could not identify whether there is an increase or decrease in the prevalence of CANS. However, a 53% of the study population reporting CANS over a one-year period is a rather substantial number. This result corresponds with our study among computer workers in the Netherlands as the one-year prevalence rate of CANS indicated that 54% of the respondents reported at least one complaint in the arm, neck and/or shoulder [10]. Furthermore a survey in the Netherlands showed that in 2002 and 2004 28% of the working population reported neck/shoulder or elbow/wrist/hand symptoms in the previous 12 months [4] and that these symptoms were at least partly caused by work. Data from the European Foundation for the Improvement of Living and Working Conditions, based on fifteen European countries, showed that 25% of the workers reported work-related neck/shoulder pain, and 15% reported work-related arm pain. As for data from countries in the region a Lebanese study among full-time, female homemakers aged 15-59 years who were not involved in the formal labour force. found that 19% had musculoskeletal disorders [18]. Al Wassan (2001) study among dentist in Saudi Arabia two hundred and four dentists and dental

auxiliary, the data obtained showed that (54.4%) of the subjects complained of neck pain. The prevalence rate among the Sudanese cohort is comparable to our Dutch data and from other data from the region, this is a remarkable result which indicates that CANS is not typical of western countries.

Further, the majority of the participants in the study were classified as mild cases, and the sever case were 9%. Though the study could not allocate the exact percent of absenteeism due to CANS however it is expected that the severe cases would have higher absenteeism rates due to their complaints. .

Though the majority of subjects were males, however, the reported complaints among females were significantly higher. This result correspond with our previous findings in a Dutch cohort [10] which indicated that the prevalence of symptoms in the neck to be 24% among men and 42% among women. Studies carried out in Lebanon showed a higher prevalence among women than men of all ages for several types of MSD. Gender differences in the prevalence of musculoskeletal complaints might be explained by differences in the effect of exposure to work-related physical and psychosocial risk factors [19]. For future studies on risk factors for CANS it may be interesting to investigate the interaction between psychosocial risk factors and gender.

We have attempted to accurately examine the measurement properties of the Arabic version of the MUEQ, but there are some limitations that worth discussion. The translation and adaptation of pre-existing questionnaires has two advantages: translated questionnaires provide an efficient way to have a valid and reliable domain that needs to be measured in the targeted language; if the translation shows good psychometric properties, such translated instruments can be used in international

comparative studies [14, 20]. However, the assumption is that simple translation is usually successful if the culture of the target population is similar to that of the original population. Because the Sudanese and the Dutch cultures are different, cultural adaptations during translation of scales were essential. The results of the psychometric analyses indicated that the two scales were psychometrically similar. In general, cultural differences did not hinder the use of the translated version among the Sudanese cohort. Thus, one can postulate that physical and psychosocial factors related to computer office work are not perceived differently by different cultures

Results from the factor analysis in the present study indicated that each domain included two scales accounting for approximately 40% of the variance. As for the reliability coefficient, Nunnally (1978) suggested a coefficient of at least 0.70 to be acceptable [15]. Cronbach's alpha coefficients for the majority of the sub-scales in the questionnaire were within this accepted number. However, some of the sub-scales (computer position, task complexity and office equipment) showed a low alpha below 0.65 and showed sub optimal item-total correlation (either below 0.2 or above 0.5). This might be due to the fact that items within the scales are too independent to be clustered in one scale. Nevertheless, the current study abstained from omitting any scale as these items were found related in previous studies to the presence of CANS [3, 5, 7].

Conclusions

Data on the prevalence of musculoskeletal disorders have been collected for several decades in Western countries. Studies on the epidemiology of complaints in the neck shoulders and arms, for example, are mostly restricted to high-income countries, comprising less than 15% of the world population [21]. Figures from developing countries are not abundant. However, a number of studies in countries such as Indonesia [22] have shown that musculoskeletal disorders are quite prevalent with the proportion of the population affected ranging from 14 to 42%. The current study documents that complaints of the arm neck and shoulder among computer office workers in Sudan seems to correspond if not higher with prevalence rates of CANS in other western and non western countries. Furthermore the study presents a valid and reliable Arabic instrument with sufficient psychometric properties to be used to assess risk factors for the development of complaints in the arm neck and shoulders. Nevertheless, we tested the psychometric properties of this questionnaire in employees without severe musculoskeletal complaints. Further evaluation of the psychometric properties of the questionnaire studies in other populations may therefore be useful.

Acknowledgements

We would like to thank the management, and employees of the Sudanese mobile company (Mobitel), Sudan Bank, Sudanese French Bank and Fisel Islamic Bank in Khartoum Sudan, for their willingness to participate in this study. Further we would like to thank the translators EH Mukhtar and A. Adel as well Dr A. Babiker the Arabic linguist for their contribution in translating and adjusting the Arabic questionnaire.

Competing interests

The author(s) declare that they have no competing interests.

Authors' contributions

S.E and J.B.S have made substantial contributions to conception and writing. S E did the data analysis and drafted the manuscript. S.A has helped in adjusting the study questionnaire and A.H has critically revised the manuscript and the statistical analysis. All authors read and approved the final manuscript

References

1. Huisstede BM, Miedema HS, Verhagen AP, Koes BW, Verhaar JA: **Multidisciplinary consensus on the terminology and classification of complaints of the arm, neck and/or shoulder**. *Occup Environ Med* 2007, **64**(5):313-319.
2. Bongers PM, Kremer AM, ter Laak J: **Are psychosocial factors, risk factors for symptoms and signs of the shoulder, elbow, or hand/wrist?: A review of the epidemiological literature**. *Am J Ind Med* 2002, **41**(5):315-342.
3. Adedoyin RA, Idowu BO, Adagunodo RE, Owoyomi AA, Idowu PA: **Musculoskeletal pain associated with the use of computer systems in Nigeria**. *Technol Health Care* 2005, **13**(2):125-130.
4. Bongers PM, Ijmker S, van den Heuvel S, Blatter BM: **Epidemiology of work related neck and upper limb problems: psychosocial and personal risk factors (part I) and effective interventions from a bio behavioural perspective (part II)**. *J Occup Rehabil* 2006, **16**(3):279-302.
5. Ijmker S, Huysmans M, Blatter BM, van der Beek AJ, van Mechelen W, Bongers PM: **Should office workers spend fewer hours at their computer? A systematic review of the literature**. *Occup Environ Med* 2006.
6. Ruess L, O'Connor SC, Cho KH, Hussain FH, Howard WJ, 3rd, Slaughter RC, Hedge A: **Carpal tunnel syndrome and cubital tunnel syndrome: work-related musculoskeletal disorders in four symptomatic radiologists**. *AJR Am J Roentgenol* 2003, **181**(1):37-42.
7. Korhonen T, Ketola R, Toivonen R, Luukkonen R, Hakkanen M, Viikari-Juntura E: **Work related and individual predictors for incident neck pain among office employees working with video display units**. *Occup Environ Med* 2003, **60**(7):475-482.
8. Ariens GA, van Mechelen W, Bongers PM, Bouter LM, van der Wal G: **Physical risk factors for neck pain**. *Scand J Work Environ Health* 2000, **26**(1):7-19.
9. Hannan LM, Monteilh CP, Gerr F, Kleinbaum DG, Marcus M: **Job strain and risk of musculoskeletal symptoms among a prospective cohort of occupational computer users**. *Scand J Work Environ Health* 2005, **31**(5):375-386.
10. Eltayeb S, Staal JB, Kennes J, Lamberts PH, de Bie RA: **Prevalence of complaints of arm, neck and shoulder among computer office workers and psychometric evaluation of a risk factor questionnaire**. *BMC Musculoskelet Disord* 2007, **8**:68.
11. Chaory K, Fayad F, Rannou F, Lefevre-Colau MM, Fermanian J, Revel M, Poiraudeau S: **Validation of the French version of the fear avoidance belief questionnaire**. *Spine* 2004, **29**(8):908-913.
12. Eum KD, Li J, Jhun HJ, Park JT, Tak SW, Karasek R, Cho SI: **Psychometric properties of the Korean version of the job content questionnaire: data from health care workers**. *Int Arch Occup Environ Health* 2007, **80**(6):497-504.
13. Guermazi M, Ghroubi S, Kassis M, Jaziri O, Keskes H, Kessomtini W, Ben Hammouda I, Elleuch MH: **[Validity and reliability of Spinal Mouse to assess lumbar flexion]**. *Ann Readapt Med Phys* 2006, **49**(4):172-177.

14. Karam EG, Mneimneh Z, Salamoun M, Akiskal KK, Akiskal HS: **Psychometric properties of the Lebanese-Arabic TEMPS-A: a national epidemiologic study**. *J Affect Disord* 2005, **87**(2-3):169-183.
15. Bot SD, Terwee CB, van der Windt DA, Feleus A, Bierma-Zeinstra SM, Knol DL, Bouter LM, Dekker J: **Internal consistency and validity of a new physical workload questionnaire**. *Occup Environ Med* 2004, **61**(12):980-986.
16. Streiner DL: **Starting at the beginning: an introduction to coefficient alpha and internal consistency**. *J Pers Assess* 2003, **80**(1):99-103.
17. de Vet HC, Ader HJ, Terwee CB, Pouwer F: **Are factor analytical techniques used appropriately in the validation of health status questionnaires? A systematic review on the quality of factor analysis of the SF-36**. *Qual Life Res* 2005, **14**(5):1203-1218; dicussion 1219-1221, 1223-1204.
18. Habib RR, Nuwayhid IA, Yeretzian JS: **Paid Work and Domestic Labor in Disadvantaged Communities on the Outskirts of Beirut, Lebanon**. *Sex Roles* 2006, **55**(5-6):321-329.
19. Hooftman WE, van der Beek AJ, Bongers PM, van Mechelen W: **Gender differences in self-reported physical and psychosocial exposures in jobs with both female and male workers**. *J Occup Environ Med* 2005, **47**(3):244-252.
20. Fayad F, Mace Y, Lefevre-Colau MM: **[Shoulder disability questionnaires: a systematic review]**. *Ann Readapt Med Phys* 2005, **48**(6):298-306.
21. Volinn E: **The epidemiology of low back pain in the rest of the world. A review of surveys in low- and middle-income countries**. *Spine* 1997, **22**(15):1747-1754.
22. Darmawan J: **Recommendations from the Community Oriented Program for Control of Rheumatic Disease for data collection for the measurement and monitoring of health in developing countries**. *Clin Rheumatol* 2007, **26**(6):853-857.

Tables

Table 1: Descriptive characteristics of the study population*

	Male N= 163	Female N=83
Gender	65.2%	34.8%
Age		
25-35	76.1	87.4
36-45	17.8	12.6
46-55	6.1	0.0
Numbers working hours/Day		
4 to7hrs	37.4	46.0
8 hrs	48.5	48.3
More than 8 hrs	14.1	04.6
Numbers of working hours with computer/Day		
3 to 5hrs	31.9	27.6
6 to 8 hrs	59.5	65.5
> 8 hrs	08.0	02.3
Numbers of working years in current position		
6 month to 1year	28.8	26.4
2 to 4 years	47.2	58.6
5 years and more	23.9	14.9

*Total Number of Subjects = 250

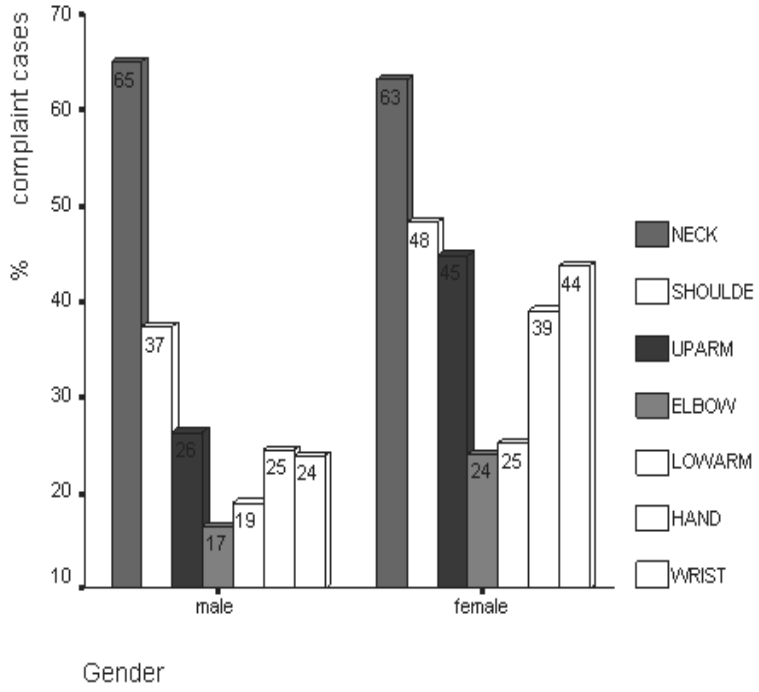

Figure 1: percentage of upper extremity musculoskeletal complaints during the previous year that lasted at least one week according to gender

Table 2: Prevalence rates of upper extremity musculoskeletal complaints during the previous year that lasted at least one week

UEM Complaint	Total Number of subjects with complaints	**Total** Prevalence (95% CI) (n = 250)	**Male** Prevalence (95% CI) (n = 163)	**Female** Prevalence (95% CI) (n = 87)
Neck complaints	161	0.64(0.58 to 0.70)	0.65 (0.57 to 0.72)	0.63 (0.52 to 0.73)
Shoulder complaints	103	0.41 (0.35 to 0.47)	0.37 (0.29 to 0.44)	0.48 (0.37 to 0.58)
Upper arm complaints	82	0.32 (0.26 to 0.38)	0.26 (0.19 to 0.33)	0.44 (0.34 to 0.55)
Elbow complaints	48	0.19 (0.14 to 0.24)	0.16(0.10 to 0.22)	0.24 (0.14 to 0.33)
Lower arm complaints	53	0.21 (0.16 to 0.26)	0.19 (0.12 to 0.25)	0.25 (0.15 to 0.34)
Wrist complaints	74	0.29 (0.23 to 0.35)	0.24(0.17 to 0.31)	0.39 (0.28 to 0.49)
Hand complaints	77	0.30 (0.25 to 0.36)	0.23 (0.17 to 0.30)	0.43(0.33 to 0.54)
Mild cases	133	0.53 (0.48 to 0.60)	0.51 (0.42 to 0.59)	0.58 (0.47 to 0.68)
Sever cases	9	0.04 (0.07 to 0.17)	0.33 (0.30 to 0.47)	0.66 (0.53 to 0.74)

Table 3: Percentages of upper extremity musculoskeletal complaints distributed by locality

Percentages	**Complaint anatomical area**					
Male (N = 133)	Shoulder complaints	Upper arm complaints	Elbow complaints	Lower arm complaints	Wrist complaints	Hand complaints
Left Side	10.4	14.1	05.5	08.6	16.6	16.6
Right Side	02.5	01.8	02.5	01.8	01.8	01.8
Both Sides	24.5	10.4□	08.6□	08.6□	05.5□	06.1□
Female (N= 131)	Shoulder complaints	Upper arm complaints	Elbow complaints	Lower arm complaints	Wrist complaints	Hand complaints
Left Side	17.2	26.4	17.2	0.0	0.0	0.0
Right Side	04.6	01.1	06.9	14.9	32.2	28.7
Both Sides	26.4□	17.2□	57.5□	10.3□	11.5□	10.3□

Table 4: Factor loadings identified using principal component analysis and the orthogonal VARIMAX rotation *

Domain	Abbreviated item description	Factor1	Factor2
Work Station		Office equipment	Computer position
	My desk at work has suitable height	**0.54**	0.22
	I have enough space to work at my office	**0.51**	0.42
	I have a file holder I use when I am typing	**0.74**	0.04
	My chair supports my lower back	**0.57**	0.30
	Keyboard is placed directly in front	0.42	**0.69**
	I sit straight in front of screen	0.03	**0.68**
Eigenvalue		1.72	1.42
% of Variance		21.5	17.9
Body Posture		Head and body posture	Awkward body posture
	I find my job physically exhausting	**0.98**	0.01
	When I work my hand is placed in straight line	**0.55**	0.01
	When I work my Head is bended	**0.98**	0.03
	When I work my head is twisted towards the left or right	**0.98**	-0.01
	When I work my body is twisted towards the left or right	**0.98**	-0.06
	I sit in a symmetrical position	**0.97**	-0.04
	I sit for long hours in one position	-0.06	**0.87**
	For 2 hours per day I sit with lifted shoulders	0.05	**0.88**
	During my work I sit in an awkward posture	0.02	**0.98**
	My work requires performing repetitive tasks	0.07	**0.92**
Eigenvalue		7.10	1.55
% of Variance		24.0%	17.5%
Break Time		Autonomy	Break quality
	I can divide my work tasks	**0.67**	0.47
	I find my work breaks sufficient	**0.68**	0.28
	I can decide when to take a break	**0.77**	0.08
	I can decide when to start and to stop	**0.78**	0.21
	My body is not placed in one position	0.06	**0.59**
	I alternate in my job task	0.41	**0.65**
	I perform job task without computer	0.53	**0.59**
	After 2 hours work I take a break for at least 10 min	0.31	**0.51**
	My breaks are spent outside the office	0.36	**0.79**
Eigenvalue		3.41	1.65
% of Variance		37.9%	18.4%

Job Control		**Skill discretion**	**Decision authority**
	I participate with other colleges in decision making	**0.75**	0.64
	I participate in implementation of job task	**0.75**	0.64
	My work develop my abilities	**0.72**	0.67
	In my work I have chance to learn new things	**0.74**	0.65
	I have to be creative in my work	**0.73**	0.66
	I undertake different tasks in my work	**0.77**	0.62
	I decide how to perform my job task	0.66	**0.73**
	I determine the time & speed job tasks	0.63	**0.76**
	I solve work problems by my self	0.64	**0.75**
Eigenvalue		8.83	0.06
% of Variance		48.7	0.12%
Job Demands		**Time pressure**	**Task complexity**
	I find trouble to finish my job tasks	**0.76**	0.21
	I take regular over times	**0.80**	-0.02
	I have limited time to finish my job	**0.74**	0.13
	I work with max speed to finish my tasks	-0.19	**0.59**
	I work under extensive work pressure	0.14	**0.73**
	I find my work tasks difficult	0.40	**0.62**
Eigenvalue		2.36	1.12
% of Variance		33.7	16.1
Social Support		**Social support**	**Work flow**
	I find support from supervisors	**0.92**	0.33
	I receive positive comments	**0.93**	0.33
	My colleagues are helpful	**0.81**	0.26
	My supervisors are helpful	**0.93**	0.33
	I get personal advice from my colleges	**0.92**	0.33
	My supervisors are considerate	**0.81**	0.25
	No contacts with other colleges	**0.92**	0.32
	The work flow goes smoothly	0.47	**0.80**
	I can ask and enquire in my work	0.47	**0.81**
	My work tasks depend on other colleges	0.18	**0.90**
	My work atmosphere is comfortable	0.18	**0.90**
	I find support from colleges	0.47	**0.81**
Eigenvalue		8.96	1.72
% of Variance		53.2%	35.8%

Table 5: Internal consistency of the fourteen sub scales

Domain	Sub Scales	Internal consistency (Cronbach's α)	Items numbers
Work Station	Sub scale 1: Office equipment	0.50	13.17.18.20
	Sub scale 2: Computer position	0.48	16.19
Body Posture	Sub scale 3: Head and body posture	0.88	25.26.27.28. 29.30
	Sub scale 4: Awkward body posture	0.66	21. 22. 24. 32
	Sub scale 5: Autonomy	0.76	50.51.54.55
Break Time	Sub scale 6: Break quality	0.79	47.48.52.53.56
Job Control	Sub scale 7: Skill discretion	0.84	31.32.33.34.36
	Sub scale 8: Decision authority	0.76	35.38.39
Job Demand	Sub scale 9: Time pressure	0.71	41.42.45.
	Sub scale 10: Task complexity	0.53	40.43.46
Social Support	Subscale 11: Social support	0.94	70.71.72.73.74.75.76
	Sub scale 12: Work flow	0.76	65.66.67.68.69

Table 6: Item-total correlation of the fourteen sub scales

Domain	Sub Scales	Item-total correlation (Min-Max)	Items numbers
Work Station	Sub scale 1: Office equipment	0.23 to 0.35	13.17.18.20
	Sub scale 2: Computer position	0.36	16.19
Body Posture	Sub scale 3: Head and body posture	0.57 to 0.90	25.26.27.28. 29.30
	Sub scale 4: Awkward body posture	0.40 to 0.96	21. 22. 24. 32
Break Time	Sub scale 5: : Autonomy	0.23 to 0.47	50.51.54.55
	Sub scale 6: Break quality	0.43 to 0.62	47.48.52.53.56
Job Control	Sub scale 7: Skill discretion	0.41 to 0.72	31.32.33.34.36
	Sub scale 8: Decision authority	0.44 to 0.53	35.38.39
Job Demands	Sub scale 9: Time pressure	0.12 to 0.30	41.42.45.
	Sub scale 10: Task complexity	0.49 to 0.56	40.43.46
Social Support	Subscale 11:Social support	0.85 to 0.88	
	Sub scale 12: Work flow	0.71 to 0.97	70.71.72.73.74.75.76

استبيان حول المشاكل في الجهاز العضلي الأعلى لدى العاملين والعاملات المستخدمين لأجهزة الكومبيوتر فى السودان

معلومات عامة:

1	الاسم الثلاثي	
2	النوع:	ذكر□ أنثى□
3	العمر:	25- 35 □ 36 – 45□ 46 -55□ 56 و ما فوق□
4	مكان العمل؟	
5	في أي قسم تعمل؟	
6	كم مدة تعمل في هذا القسم؟ .	_____ شهر
7	ما وظيفتك الحالية؟	
8	كم عام أو شهرا تعمل في هذه الوظيفة؟	_____ شهر
9	كم ساعة باليوم تعمل؟	_____ ساعة
10	كم عدد الساعات الاضافية؟	_____ ساعة
11	كم ساعة باليوم تعمل خلف جهاز الكمبيوتر؟	_____ ساعة
12	كم ساعة باليوم تؤدى مهام أخرى (حضور اجتماعات الخ)	_____ساعة

وضع العمل مكان العمل

13	الطاولة التي اعمل فيها ارتفاعها مناسب معي.	نعم □	لا□
14	يمكنني التحكم بارتفاع الكرسي.	نعم □	لا□
15	عند استخدامي لجهازالفارة(Mouse)تكون يدي مستندة على الطاولة.	نعم □	لا□
16	كرسي العمل الذي أجلس عليه يسند الجزء الأسفل من ظهرى.	نعم □	لا□
17	جهاز الـ Keyboard يقع أمامي مباشرة.	نعم □	لا□
18	يمكنني الجلوس بشكل أفقي (مستقيم) أمام شاشة الكمبيوتر.	نعم □	لا□
19	بحوزتي حافظة للمستندات تثبت بها المستندات حين طباعتها	نعم □	لا□
20	لدى المساحة الكافية للعمل بمكتبي (طاولتي).	نعم □	لا□

جلوسك أثناء العمل

		دائماً	كثيراً	أحياناً	نادراً	لا يحدث
21	أثناء عملي أجلس مدة طويلة في نفس الوضع.	□	□	□	□	□
22	لأكثر من ساعتين في اليوم تكون أكتافي في وضع مشدود (غير مسترخي).	□	□	□	□	□
23	أثناء عملي أجلس في وضع غير مريح.	□	□	□	□	□
24	عملي يتطلب أداء مهام بها حركات متكررة (طباعة)	□	□	□	□	□
25	أجد طبيعة عملي مرهقة جسمانياً.	□	□	□	□	□

		دائماً	كثيراً	أحياناً	نادراً	لا يحدث
26	عندما أطبع يكون ساعدي في خط مستقيم مع أسفل ذراعي (اليد ممتدة)	□	□	□	□	□
27	عندما أعمل يكون رأسي في وضع منحني إلى الأسفل	□	□	□	□	□
28	عندم عندما أعمل يكون رأسي في وضع مائل إلى جهة اليمين أوالشمال	□	□	□	□	□
29	عندمأعمل يكون جسدي في وضع مائل إلى جهة اليمين أوالشمال	□	□	□	□	□
30	أثناء عملي أجلس بشكل مستقيم (غير متكيء على جانب)	□	□	□	□	□

محتوى العمل:

		دائماً	كثيراً	أحياناً	نادراً	لا يحدث
31	في وظيفتي يمكنني أن أحدد كيفية إنجاز مهام العمل	□	□	□	□	□
32	عملي يشبع قدراتي	□	□	□	□	□
33	عملي يوفر لي فرص لاكتساب معلومات جديدة	□	□	□	□	□
34	يمكنني أن أشارك في كيفية سير العمل	□	□	□	□	□
35	أحصل في عملي على مساحة لأتخذ القرار بنفسي	□	□	□	□	□
36	في عملي يتوجب علىّ أن أكون مبتكرا	□	□	□	□	□
37	في عملي أحصل على مهام عديدة متنوعة	□	□	□	□	□
38	يمكنني أن أتحكم في تحديد السرعة التي أؤدي بها العمل	□	□	□	□	□
39	أحصل على الفرصة الكافية لحل معضلات العمل بنفسي	□	□	□	□	□

طبيعة العمل:

		دائماً	كثيراً	أحياناً	نادراً	لا يحدث
40	أجد نفسي أعمل تحت ضغط عالٍ	□	□	□	□	□
41	أجد صعوبة في إنجاز مهام عملي في الوقت المحدد	□	□	□	□	□
42	أجد نفسي أعمل ساعات إضافية لانجازمهام عملي في وقتها	□	□	□	□	□
43	أجد مهام عملي صعبة	□	□	□	□	□
44	أجد مهام عملي كثيرة	□	□	□	□	□
45	لا أجد الوقت الكافي في عملي لإنجاز مهامي	□	□	□	□	□
46	أثناء عملي يجب علىّ العمل بسرعة لإنجاز مهامي	□	□	□	□	□

زمن الراحة (الفسحة)

		دائماً	كثيراً	أحياناً	نادراً	لا يحدث
47	أثناء أدائي لعملي لا يكون جسدي في وضع واحد	□	□	□	□	□
48	أثناء عملي أبدل في أدء مهامي	□	□	□	□	□
49	أثناء عملي يمكنني أن أحدد الزمن الذي آخذ فيه راحة أو فسحة	□	□	□	□	□
50	يمكنني بنفسي أن أحدد متى أبدأ في المهمة ومتى أنتهي منها	□	□	□	□	□
51	أثناء عملي اؤدى مهام أخرى لا تتطلب استخدام الكمبيوتر	□	□	□	□	□
52	بعد عملي **لساعتين** متواصلتين خلف الكمبيوتر آخذ راحة لا تقل عن **10** دقائق	□	□	□	□	□
53	يمكنني أن أقسم مهام عملي إذا رأيت ذلك ضروريا	□	□	□	□	□
54	في اليوم العملي أجد أن زمن فسحة الراحة كافيا	□	□	□	□	□
55	فسحة الافطار أو الشاي تكون خارج المكتب	□	□	□	□	□

بيئة العمل:

		دائماً	كثيراً	أحياناً	نادراً	لا يحدث
56	أجد بيئة عملي جيدة (نظيفة،مضيئة)	□	□	□	□	□
57	داخل المكتب يكون الهواء جاف جداً.	□	□	□	□	□
58	داخل المكتب يكون الهواء حار	□	□	□	□	□
59	أجهزة التبريد تكون باردة جداً	□	□	□	□	□
60	في مكان عملي يتوفر الهواء الطبيعي	□	□	□	□	□
61	بيئة عملي مزعجة (جلبة ناس)	□	□	□	□	□
62	مكان عملي مضاء بشكل قوي	□	□	□	□	□
63	شاشة الكمبيوتر تعكس إضاءة غرفة المكتب	□	□	□	□	□

دعم اجتماعي:

		دائماً	كثيرً	أحياناً	نادراً	لا يحدث
64	العمل يسير بشكل منظم	□	□	□	□	□
65	يمكنني أن استفسر بشكل كاف في عملي	□	□	□	□	□
66	طبيعة عملي تعتمد كثيراً على زملائي	□	□	□	□	□
67	أصف العلاقات العامة في العمل بأنها مريحة	□	□	□	□	□
68	إذا أخطأت في مهام عملي أجد الدعم والإرشاد الكافي من زملائي	□	□	□	□	□
69	إذا أخطأت في مهام عملي أجد الدعم والإرشاد الكافي من رؤسائي	□	□	□	□	□
70	اشعر بتقييم اجيابى لعملي من زملائي	□	□	□	□	□
71	زملائي في العمل متعاونون	□	□	□	□	□
72	رؤسائي في العمل متعاونون	□	□	□	□	□
73	أجد الدعم النفسي في أموري الخاصة من زملائي	□	□	□	□	□
74	رؤسائي في العمل يقدرون إذا مررت بظروف شخصية صعبة	□	□	□	□	□
75	طبيعة عملي لا توفر لي فرصة التعامل مع زملائي	□	□	□	□	□

الشكاوى الجسمانية:. الجهاز العضلي الأعلى

في هذه اللحظة ولمدة **أسبوع** على الأقل أشعر بألم / بشكوى في احد أو أكثر من المناطق الآتية:

76	**العنق**	لا □ نعم □		
77	**الأكتاف**	لا □ نعم □ ←	إذا نعم	الأيمن □ الأيسر □ الاثنان معاً □
78	**الجزء الأعلى من الذراع**	لا □ نعم □ ←	إذا نعم	الأيمن □ الأيسر □ الاثنان معاً □
79	**لمرفق (الكوع)**	لا □ نعم □ ←	إذا نعم	الأيمن □ الأيسر □ الاثنان معاً □
80	**الجزء الأسفل من الذراع**	لا □ نعم □ ←	إذا نعم	الأيمن □ الأيسر □ الاثنان معاً □
81	**الكف**	لا □ نعم □ ←	إذا نعم	الأيمن □ الأيسر □ الاثنان معاً □
82	**المعصم**	لا □ نعم □ ←	إذا نعم	الأيمن □ الأيسر □ الاثنان معاً □

من هنا يستخدم تعبير (**الجهازالعضلي الأعلى**) من الجسد للتعبير عن:
(العنق أو الأكتاف أو الكف أو المعصم أو المرفق أو الذراع)

83	في العام الماضي أشعر بألم في الجهاز العضلي الأعلى	نعم□	لا□	
84	في العام الماضي أدت شكاوى في الجهاز العضلي الأعلى إلى حد أنشطتي	نعم□	لا□	
85	خلال العام الماضي أدت شكاوي في الجهاز العضلي الأعلى إلى الذهاب إلى الطبيب	نعم□	لا□	
86	تشخيص الطبيب لمشاكلي في الجهاز العضلي الأعلى:	شد عضلي □	رطوبة □	أخري حدد
87	هل ذكر الطبيب سبب للشكوى أعلاه	نعم□	لا□	إذا نعم حدد
88	أضطررت للتغيب من العمل نتيجة الشكوى من مشاكل الجهاز العضلي الأعلى	نعم□	لا□	
89	آلام (الجهاز العضلي الأعلى) أدت لفقداني وظيفة من قبل	نعم□	لا□	
90	أثناء شكوتي من آلام (الجهاز العضلي الأعل) قلت أنشطتي: في مجال عملي	نعم□	لا□	
91	أثناء شكوتي من آلام (الجهاز العضلي الأعل) قلت أنشطتي: في مجالي الاجتماعي	نعم□	لا□	
92	شكواى الآن من الآلام في (الجهاز العضلي الأعلى) نتيجة لحادث/ إصابة	نعم□	لا□	

الأسئلة القادمة تتعلق ، إذا كنت تشكو في العام الماضي من ألم أو عدم راحة في الجهاز العضلي الأعلى
(العنق أو الأكتاف أو الكف أو المعصم أو المرفق أو الذراع)

93	أشعر بألم في الجهاز العضلي الأعلى بعد انتهاء العمل مباشرة	لا □ نعم □ ←	إذا نعم	يزول شعوري الألم بعد قسط من الراحة	نعم □ لا □
94	أشعر بالإرهاق أو التعب في الجهاز العضلي الأعلى	لا □ نعم □ ←	إذا نعم	ينتهي شعور الإرهاق بعد قسط من الراحة	نعم □ لا □
95	أشعر بتقلصات في أصابع يدي.	لا □ نعم □ ←	إذا نعم	تنتهي التقلصات بعد قسط من الراحة	نعم □ لا □
96	أشعر بتنميل (خدر) في أصابعي	لا □ نعم □ ←	إذا نعم	ينتهي شعور التنميل بعد قسط من الراحة	نعم □ لا □
97	أشعر بوخزات في أصابعي	لا □ نعم □ ←	إذا نعم	يبقى هذا الشعور بعد قسط من الراحة	نعم □ لا □
98	أشعر بضعف في قواي أو ارتخاء في الجهاز العضلي الأعلى	لا □ نعم □ ←	إذا نعم	يبقى هذا الشعور بعد إنتهاء اليوم العملي	نعم □ لا □

99	أعاني من تورم أو انتفاخ في أصابع يدي	لا □ نعم □ ←	إذا نعم	يبقى هذا الشعور بعد إنتهاء اليوم العملي	نعم □ لا □
100	أشعر بتورم/ تقلص/ في(الجهاز العضلي الأعلي).	لا □ نعم □			
101	أشعر بألم متواصل في (الجهاز العضلي الأعلى)	لا □ نعم □			
102	لدى الإحساس بتغير في درجة حرارتي أو لون الجلد أو العرق في(الجهاز العضلي الأعلى)	لا □ نعم □			
103	استخدم سنادة لجهاز الفارة(Mouse) / سنادة أقدام لتخفيض الضغط على(الجهاز العضلي الأعلى)	لا □ نعم □			
104	هل تلقيت أي علاج للتخفيف من مشاكلك	لا □ نعم □ ←	إذا نعم		علاج طبيعي □ علاج بلدي البصير □ أدوية مسكنة □ أخرى □
105	شعر إنني في صحة جسمانية جيدة.	لا □ نعم □			
106	بجانب عملي أودي واجباتي المنزلية بشكل جيد	لا □ نعم □			
107	استخدم الكمبيوتر في المنزل (للعمل أو الترفيه)	لا □ نعم □			