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Prevalence and Impact of Work-Related Musculoskeletal Disorders on Job Performance of Call Center Operators in Nigeria

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Abstract:

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Background: Work-related musculoskeletal disorders (WMSDs) have been documented among various occupational groups in Nigeria. However, there is limited data on the prevalence of WMSDs among call center operators (CCOs).

Objective: To determine the prevalence of WMSDs among CCOs in Nigeria and to explore the extent to which these discomforts impact the daily work activities of the respondents.

Methods: 374 respondents who were randomly selected from 4 telecommunication companies in Lagos State, Nigeria, participated in this study. They were asked to complete a pre-tested questionnaire designed to capture the prevalence, impact and associated risk factors of WMSDs among CCOs.

Results: 42% and 65.2% of respondents experienced at least one WMSDs in the past 7 days, and 12 months, respectively. Women and CCOs who received calls with hand-held phones rather than headsets reported more discomforts during both 7 days and 12 months periods. Neck, shoulder, upper back, and lower back were the most affected areas during past 7 days and 12 months. Discomforts in the neck, low back, and knees prevented most of the respondents from performing their daily work.

Conclusion: WMSDs have a serious impact on the daily job activities of the CCOs in Nigeria.

Keywords: Health impact assessment; Musculoskeletal diseases; Telecommunications; Human engineering; Telephone; Computer terminals

Introduction

Work-related musculoskeletal disorders (WMSDs) are among important occupational diseases.¹ The prevalence and impact of WMSDs on quality of life have been documented for different occupational groups. WMSDs have been shown to contribute to absen-

teeism or loss of work hour with significant economic impact.^{2,3} In Nigeria, the prevalence of WMSDs varies among different occupational groups; the prevalence is 91.3% among physiotherapists,⁴ 78% among nurses,⁵ and 64.4% among health care workers.⁶ The 12-month prevalence of WMSDs was found to be as high as 93.2% among computer users in Nige-

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Received: Jun 18, 2015
Accepted: Mar 5, 2016

Cite this article as: Odebiyi DO, Akanle OT, Akinbo SRA, Balogun SA. Prevalence and impact of work-related musculoskeletal disorders on job performance of call center operators in Nigeria. *Int J Occup Environ Med* 2016;7:98-106.

ria.⁷ There is limited data about the occurrence of WMSDs among call-center operators (CCOs). Furthermore, little is known about the extent to which WMSDs impact the work of CCOs in Nigeria.

CCOs are those who use telephone and computer to market or manage communications for an organization or government agencies.⁸ Call centers are one of the fastest growing sectors of the labor market in both developed and developing countries; and employ large numbers of workers.^{9,10} Therefore, telecommuting is becoming more prominent in the workforce with 89 of the top 100 US companies.¹¹ Werth and Babski-Reeves have estimated that there was an approximately threefold increase (4.65 million to 13.65 million) in people telecommuting more than 8 hrs/week from 1998 to 2008.¹² There are estimated 1.5 million people employed in call centers in Europe and about 5 million people employed in the USA.¹³ In Nigeria, the number of call centers has increased rapidly over the last decades following the privatization of the telecommunication industry, and many organizations are now outsourcing their telephone services to the increasing private call center companies. However, data about the estimated number of people employed in various call centers in the country is hard to find.

While studies from Nigeria are rare, research from other countries reveals a high prevalence of musculoskeletal discomforts (MSDs) among CCOs. These MSDs have been reported to affect the neck, shoulder, back, and the arms.^{14,15} However, neck and shoulder discomforts have been reported to be more pronounced and led to the concept of “neck-shoulder pain syndrome” among CCOs.¹³ A number of factors such as inadequate height of table, answering more than 140 calls per day, making fewer rest break,⁸ lack of computer training, conflict at work,¹⁶ and female gender,¹³ have been attributed to the high prevalence of

TAKE-HOME MESSAGE

- Work-related musculoskeletal disorders (WMSDs) contribute to absenteeism or loss of work hour with significant economic impact.
- Call centers are one of the fastest growing sectors of the labor market in both developed and developing countries; and employ large numbers of workers.
- WMSDs were common among call-center operators (CCOs) in Nigeria.
- Discomforts in the neck and low back mostly affect the daily activities of majority of CCOs.
- Severity of the shoulder and upper back discomfort was more than the knee discomforts.

WMSDs among CCOs. In addition, mental demands of call center work are considered one of the major factors influencing the timing and severity of musculoskeletal symptoms experienced by CCOs.¹⁴ For instance, Caple documented that when a new software program was introduced, CCOs reported increased discomforts in their neck and shoulder.¹⁴ The increased discomfort was attributed to the pressure to learn, and to use the new applications without compromising the quality of services offered to clients. With the increasing number of call centers and the growing number of employees in this emerging and important sector of the Nigerian workforce, there is an urgent need to examine discomforts associated with call center jobs.

We conducted this study to provide data about the prevalence and associated risk factors of WMSDs among CCOs in Nigeria. In addition, this study aimed to explore the extent to which WMSDs impact the job performance of work of CCOs. An understanding of the prevalence and possible risk factors of WMSDs among CCOs could be vital in the design of appropri-

Table 1: Demographic and work characteristics of the respondents (n=374)

Variables	n (%)
Sex	
Male	135 (36.1)
Female	239 (63.9)
Respondents' age groups (yrs)	
20–29	176 (47.0)
30–39	194 (51.9)
40–49	4 (1.1)
Duration of working as a call center operator	
<24 months	157 (42.0)
≥24 months	217 (58.0)
Mean work hour per day	
<8 hours	163 (43.6)
≥8 hours	211 (56.4)
Number of calls answered in a day	
<140	140 (37.4)
≥140 and above	187 (50.0)
No response	47 (12.6)
Do you work overtime?	
Yes	183 (48.9)
No	191 (51.1)
Mode of receiving calls	
Handset	76 (20.3)
Headset	286 (76.5)
No response	12 (3.2)

ate interventions that may help reduce the WMSDs.

Material and Methods

In a cross-sectional study, 400 CCOs were

selected from the four major Telecommunication Companies that had their call centers in Lagos State, Nigeria. Participants aged 20 years and above with work history of not less than one year in a call center. All participants consented to enroll in this study. A systematic random sampling technique was used to select 100 participants each from the call center unit of the four major Telecommunication Companies. Simple random sampling of fish and bowl method was used to select 25 participants from the 100 participants selected from the four companies.

The initial draft of the questionnaire was adapted from a previous study on risk factors of WMSDs among CCOs,⁸ and was used as a working document, which was used by a three-man experts discussion group to develop the final draft. Adjustments were made according to their input to come up with the final draft. Thereafter, the questionnaire was pilot-tested. The questionnaire consisted of 48 items, was divided into seven sections, and collected information on bio-data regarding participants' age and educational attainment; experience of WMSDs during past 7 days and 12 months; work history; work organization (including questions about the number of calls received in a day and how the calls were received; and whether the respondents make use of headsets or a hand-held telephone); impact of WMSDs; and the types of interventions they took following the experience of WMSDs.

Copies of the questionnaire were distributed, using face-to-face interview, to only those who consented. The collection of copies of the questionnaire was done by hand immediately after they were filled by the participants. Ethical approval was obtained from the Health Research and Ethics Committee of Lagos University Teaching Hospital, and permission from the unit heads of studied telecommunication companies were sought for and obtained

before the commencement of the study.

Statistical Analysis

SPSS® for Windows® ver 20 was used for statistical analysis. Pearson's χ^2 test was used to examine the association between the experience WMSDs and the respondents' demographic and work organization variables. In this study, we asked for experience of WMSDs in nine body regions—neck, shoulder, upper back, elbows, low back, wrist/hands, hips/thighs, knees, and ankle/feet. Responses to the experience of symptoms in studied body parts were dichotomized ('1' if the respondents experienced discomfort, and '0' if no symptom was experienced). This response was summed for each body regions to create a total score for the total number of WMSDs experienced by the respondents. A p value <0.05 was considered statistically significant.

Results

Out of the 400 copies of the questionnaire distributed, 374 were returned that translates to a response rate of 93.5%. Women constituted a higher proportion of the CCOs; the number of women (n=239, 63.9%) is nearly doubled that of the men (n=135, 36.1%) (Table 1). Majority (n=217, 58%) of the CCOs had been working in the industry for more than two years; 211 (56%) of the CCOs worked for more than 8 hrs/day. Most of the respondents (n=370, 98.9%) were young adults; only four (1.1%) aged 40 years and above. Majority (n=187, 50%) of the respondents received more than 140 calls per day. The number of those working over-time (n=187, 48.9%) was slightly lower than those who do not (n=191, 51.1%). As expected, headset is the most frequently used medium of receiving calls among the respondents (n=286, 76.5%).

The prevalence of WMSDs was 65.2%

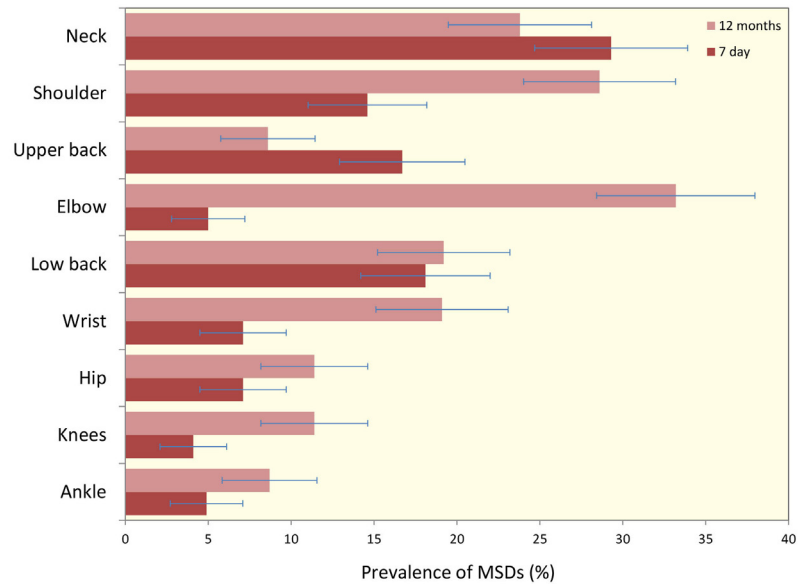


Figure 1: Regional distribution of musculoskeletal discomforts over past 7 days and 12 months. Error bars represent 95% confidence interval.

for the past 12 months and 42% for the past 7 days. The prevalence of MSDs in various body regions over the last 12 months and 7 days was somewhat inconsistent (Fig 1). For instance, discomfort in the elbow was the most prevalent MSD experienced during 12 months prior to data collection; this was followed by discomfort in the shoulder and the neck. However, discomfort in the neck, low back and upper back were the most prevalent complaints experienced during the last 7 days. Consistent among the three most prevailing discomforts experienced over 12 months and 7 days was the neck discomfort. Majority of the respondents reported reduction in discomfort experienced during 7 days prior to data collection compared to the ones experienced during the past 12 months; on the contrary, discomfort in the neck and upper back increased during this period. Worthy of note was the finding that low back discomfort only changed slightly over the past 7 days and 12 months.

Compared to the men, women reported a higher prevalence of WMSDs across vari-

Table 2: Association between 12-month and 7-day prevalence of WMSD (stratified by body parts affected) and gender (n=374).

Body parts	12-month prevalence			7-day prevalence		
	Male, n (%)	Female, n (%)	p value	Male, n (%)	Female, n (%)	p value
Neck	61 (46.2)	120 (51.9)	0.293	35 (26.1)	72 (31.2)	0.307
Shoulder	22 (16.9)	63 (27.8)	0.021	16 (12.1)	37 (15.9)	0.320
Upper back	133 (25.6)	234 (30.3)	0.330	20 (15.0)	41 (17.6)	0.528
Elbow	8 (6.1)	23 (10.0)	0.197	6 (4.6)	12 (5.2)	0.796
Low back	40 (31.2)	80 (34.3)	0.552	24 (18.3)	42 (17.9)	0.929
Wrist	22 (16.5)	48 (20.5)	0.352	8 (6.1)	18 (7.6)	0.581
Hips	22 (16.5)	48 (20.5)	0.779	8 (6.1)	18 (7.6)	0.574
Knees	10 (7.6)	32 (13.5)	0.086	5 (3.8)	10 (4.2)	0.834
Ankles	9 (6.8)	23 (9.7)	0.345	5 (3.8)	13 (5.5)	0.472

ous body regions over the past 12 months; however, this difference was only significant for the shoulder (Table 2). With the exception of discomfort in the low back,

Table 3: Number of WMSDs reported by the respondents over 12-month and 7-day period (n=374)

Number of WMSDs	12 months, n (%)	7 days, n (%)
0	130 (34.8)	217 (58.0)
1	81 (21.7)	56 (15.0)
2	42 (11.2)	51 (13.6)
3	53 (14.2)	23 (6.1)
4	23 (6.1)	11 (2.9)
5	13 (3.5)	3 (0.8)
6	15 (4.0)	2 (0.5)
7	6 (1.6)	3 (0.8)
8	4 (1.1)	1 (0.3)
9	7 (1.9)	7 (1.9)
Total	374 (100.0)	374 (100.0)

the proportion of women reporting WMSDs over past 7 days was higher than men; however, none of these differences were statistically significant. The number of respondents with no WMSDs over the past 7 days and 12 months was 218 (58%) and 130 (34.8%), respectively (Table 3). The number of those with at least one WMSDs experienced during previous 7 days and 12 months, were 157 (42.0%) and 244 (65.2%), respectively.

Respondents who received calls with handheld telephones reported more than twice elbow discomfort experienced by those who received calls with headsets over both 12 months and 7 days prior to data collection (Table 4). Furthermore, those who received calls with handheld phones experienced a significantly higher discomfort in the neck (n=29, 39.2%) and upper back (n=19, 26.4%) compared with those receiving calls with headsets.

Figure 2 shows the proportion of call center operators whose daily work were affected due to WMSDs and the percent of

Table 4: Difference between WMSD reported by respondents who receive calls with hand held phones and headsets

Body parts	12-month prevalence			7-day prevalence		
	Handset, n (%)	Headset, n (%)	p value	Handset, n (%)	Headset, n (%)	p value
Neck	73 (47.9)	278 (51.1)	0.634	29 (39.2)	74 (26.5)	0.033
Shoulder	21 (29.2)	59 (21.6)	0.177	14 (19.7)	34 (12.1)	0.095
Upper back	73 (37.0)	282 (27.3)	0.105	19 (26.4)	41 (14.5)	0.017
Elbow	11 (15.5)	19 (6.8)	0.020	7 (9.7)	10 (3.6)	0.030
Low back	24 (33.3)	90 (32.4)	0.877	15 (20.3)	50 (17.9)	0.633
Wrist	12 (16.4)	54 (19.1)	0.604	7 (9.5)	17 (6.0)	0.310
Hips	8 (11.0)	34 (12.0)	0.811	7 (9.5)	19 (6.7)	0.423
Knees	7 (9.5)	32 (11.3)	0.657	5 (6.8)	10 (3.5)	0.221
Ankles	8 (10.8)	24 (8.5)	0.526	7 (9.5)	11 (3.9)	0.058

those who visited by a health professional because of the discomfort. Discomforts in the neck and low back prevented majority of the respondents from performing their daily work. Most of the respondents were visited by a health professional because of neck and low back discomforts. Discomforts in the knees affected the daily job of 2.1% of the respondents compared with 1.6% in the upper back, 1.6% in the wrist, and 1.4% in the shoulder, yet majority of the respondents were visited by health professionals for care of discomforts in the upper back, shoulder, and wrist compared to the knees (Fig 2).

Discussion

WMSDs were common among CCOs in Nigeria. The prevalence of WMSDs during the past 12 months and 7 days among the studied CCOs were 65.2% and 42%, respectively, with a higher prevalence observed among women (65.7%) than men (34.3%). The finding that studied women suffered WMSDs more frequently than men is in keeping with previous studies on

CCOs.^{8,13,17,18}

In situations where both male and female CCOs performed the same tasks, such observed gender disparity in occurrence of MSDs was suggested to be due to individu-

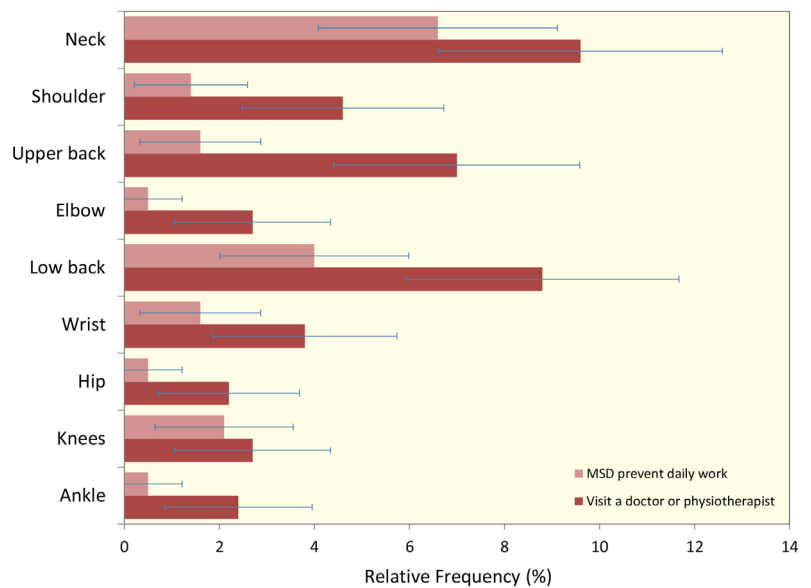


Figure 2: Impact of WMSDs on daily job activities and the percent of respondents who visited health professionals after experiencing WMSDs. Error bars represent 95% confidence interval.

al factors, working technique, coping strategies, and factors outside work.¹³ It may also be due to the difference in occupational exposure.¹⁹ When men and women are in the same occupation, difference in work tasks has been advocated as one of the reasons for a higher prevalence of WMSDs among women.¹⁸ To test this assertion, further analysis of gender variation in the respondents' work characteristics was done (analysis not shown, but available on request). The results showed that a higher proportion of female CCOs worked for more than eight hours, received more than 140 calls per day, and mostly worked over time compared to their male counterparts. These could explain the higher prevalence of WMSDs observed among female CCOs.

The reported 12-month prevalence of WMSDs in this study was lower than that reported in other occupational groups in Nigeria, *eg*, physiotherapist (91.3%),⁴ nurses (78%),⁵ computer users (93.2%),⁷ and health professionals (68.7%).⁶ It seems that the monotonous nature of CCOs' work has been shown to increase repetitive strain and predispose them to a higher risk of WMSDs.¹³ Previous studies documented a higher prevalence of MSDs among CCOs compared to other occupational groups.^{17,20} A cross-sectional study conducted in Sweden comparing the prevalence of MSDs in 15 occupational groups, found that the prevalence was highest among CCOs compared to other groups.²⁰ It has been suggested that simultaneous use of computer and telephone and being under pressure to have an effective communication with their clients within a limited time, as well as direct performance monitoring may be the major risk factors for the reported high occurrence of MSDs among CCOs.¹⁸ The lower prevalence of MSDs observed among CCOs in our study could reflect a lower risk of MSDs among CCOs in Nigeria. The majority of the CCOs used headset in answering calls, which reduced the re-

petitive movements.

The distribution of MSDs over 7-day period revealed a high prevalence of symptoms in the neck region, followed by the low back, and upper back regions. The distribution over 12-month period showed a high prevalence of symptoms in the elbow, followed by the shoulder, and neck. The finding that the neck, shoulder, and back regions (low back and upper back) were mostly affected is in line with the trend in the literature.^{8,17} With the exception of shoulder and upper back discomforts, 7-day prevalence of WMSDs in our study, was much lower than 12-month prevalence in body parts examined. In addition, the number of discomforts experienced by the respondents over the previous 7 days was lower than that experienced during the past 12 months. Persistent between 7-day and 12-month prevalence, was the discomfort in the neck. Repetitive strain associated with the operation¹³ and poor ergonomic supports could have contributed to the high prevalence of MSDs in neck. For instance, respondents who received calls with the use of telephone reported twice discomforts in their elbows compared to those who received calls by a headset. One of the call duties of CCOs is receiving calls. Frequent use of handheld telephone in receiving calls could increase strain in the elbow that may explain the high prevalence of elbow discomforts among respondents who received calls with telephone.

Discomforts in the neck and low back mostly affect the daily activities of majority of CCOs. It is not surprising that majority of the respondents were visited by a health professional because of such complaints. Despite influencing the respondents' daily work (2.1%) more than discomforts in the shoulder (1.4%) and upper back (1.6%), fewer respondents were visited by a health professional because of knee discomforts. A possible reason for this observation could be that severity of the shoulder and

upper back discomfort was more than the knee discomforts.

A limitation in our study was that we only inquired whether the respondents had WMSDs or not but we did not use measures such as visual analogue pain score to assess the severity of symptoms.

Considering the high prevalence of WMSDs among CCOs (particularly in female workers) in Nigeria, appropriate interventions to reduce these discomforts and promote a safe work environment should be a priority in future research.

Acknowledgements

The authors would like thank the CCOs of the four telecommunication industries who volunteered to participate in this study.

Conflict of interest: None Declared.

References

1. Anap D, Iyer C, Rao K. Work related musculoskeletal disorders among hospital nurses in rural Maharashtra, India: a multi centre survey. *Int J Res Med Sci* 2013;**1**:101.
2. Stewart WF, Ricc JA, Morganstein D, Lipton R. Lost productive time and cost due to common pain conditions in the US workforce. *JAMA* 2003;**290**:2443-54.
3. Escorpizo R, Bombardier C, Boonen A, *et al*. Worker productivity outcome measures in arthritis. *J Rheum* 2007;**34**:1372-80.
4. Adegoke BOA, Akodu AK, Oyeyemi AL. Work-related musculoskeletal disorders among Nigerian physiotherapists. *BMC Musculoskelet Disord* 2008;**9**:112.
5. Tinubu BMS, Chidozie EM, Adewale LO, Ayodele AF. Work-related musculoskeletal disorders among nurses in Ibadan, South-west Nigeria: a cross-sectional survey. *BMC Musculoskelet Disord* 2010;**11**:12.
6. Mbada CE, Obembe AO, Alade BS, *et al*. Work-Related Musculoskeletal Disorders among Health Workers in a Nigerian Teaching Hospital. *TAF Preventive Medicine Bulletin* 2012;**11**:583-8.
7. Ayanniyi O, Ukpai BOO, Adeniyi AF. Differences in prevalence of self-reported musculoskeletal symptoms among computer and non-computer users in a Nigerian population: a cross-sectional study. *BMC Musculoskelet Disord* 2010;**11**:177.
8. Rocha LE, Glina DMR, Marinho MF, Nakasato D. Risk Factors for Musculoskeletal Symptoms among Call Center Operators of a Bank in Sao Paulo, Brazil. *Ind Health* 2005;**43**: 637-46.
9. Nadeem S. The uses and abuses of time: globalization and time arbitrage in India's outsourcing industries. *Global Networks* 2009;**9**:20-40.
10. Norman K, Tornquist E, Toomingas A. Working conditions in a selected sample of call centre companies in Sweden. *Int J Occup Saf Ergon* 2008;**14**:177-94.
11. Telework Coalition. Telework Facts, 2010. Retrieved from the Telework Coalition. Available from www.telcoa.org/id33.htm (Accessed November 20, 2015).
12. Werth A, Babski-Reeves K. Effects of portable computing devices on posture, muscle activation levels and efficiency. *Appl Ergon* 2014;**45**:1603-9.
13. Toomingas A, Nilsson T, Hagberg M, *et al*. Symptoms and Clinical Findings from the Musculoskeletal System among Operators at a Call Centre in Sweden- A 10-month Follow-up Study. *Int J Occup Saf Ergon* 2003;**9**:403-18.
14. Caple DC. Holistic approaches to the prevention of musculoskeletal disorders among call-center workers. *Scan J Work Environ Health (Suppl)* 2007;**3**:81-4.
15. Widanarko B, Legg S, Stevenson M, *et al*. Prevalence and work-related risk factors for reduced activities and absenteeism due to low back symptoms. *Appl Ergon* 2011;**43**:727-37.
16. Westin AF. Two key factors that belong in a macroergonomic analysis of electronic monitoring: Employee perceptions of fairness and the climate of organizational trust or distrust. *Appl Ergon* 1992;**23**:35-42.
17. Angelo D, Patrizia C, Umberto F, *et al*. Risk factors for upper extremity musculoskeletal symptoms among call center employees. *J Occup Health* 2010;**52**:115-24.
18. Subbarayalu AV. Occupational Health Problems of Call Center Workers in India: A Cross Sectional Study Focusing on Gender Differences. *J Manag Sci Practice* 2013;**1**:63-70.

19. Dennis RA, Kristie JN. Head and Neck Posture at Computer workstations-What is neutral? In Proceedings of the 14th Triennial Congress of the International Ergonomics Association **2000**: 565-8.
20. Karlqvist L, Wigaeus T, Hagberg M, *et al.* Self-reported working conditions of VDU operators and associations with musculoskeletal symptoms: a cross-sectional study focussing on gender differences. *Int J Occup Saf Ergon* 2002;**30**:277-94.

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