


ORIGINAL RESEARCH ARTICLE

Open Access



Prevalence and factors associated with neck pain among research and development department staff in Bangladesh: a cross-sectional study

Md. Omar Sharif Ahmmed Chowdhury^{1,2*} , Abu Naser Md Rasal³, Nurul Huda⁴, Shahana Islam⁵ and Most. Rumpa Khatun⁶

Abstract

Background Neck pain is the most common musculoskeletal complexity with a high prevalence, especially in adults and the elderly.

Objectives The objective of our study is to investigate the prevalence and associated factors of neck pain in research and development department staff in Bangladesh.

Methodology Data were collected through questionnaire-assisted interviews to investigate the prevalence and related factors of neck pain among 384 R&D employees aged 18–55 years in Bangladesh. We performed regression analysis on neck pain and associated risk factors to uncover its sociodemographic and occupational correlates.

Results The neck pain prevalence was high in this investigation, which is 35.7%, and of these, 27.6% affected the general working ability of the employees. The results indicated that people aged 40 to above years were more significantly to have neck pain, with an OR of 6.148 ($p = 0.046$), and BMI results indicated that those who were underweight were slightly significantly to have pain ($p < 0.001$). Again, educational qualification especially HSC or diploma OR 15.600 ($p = 0.020$) and those who often work on the computer were more significantly to have neck pain, with OR 8.801 ($p = 0.078$).

Conclusions This study showed that the prevalence of neck pain was high among R&D workers in private industry. In this investigation, several factors associated with neck pain were found through logistic regression evaluation. The results of this study indicated that age, BMI, educational qualification, and those who frequently worked on computers had higher neck pain.

Keywords Research and development employees, Risk factors, Neck pain, Associated factors, Bangladesh

*Correspondence:

Md. Omar Sharif Ahmmed Chowdhury
oschowdhury33@gmail.com

Full list of author information is available at the end of the article



© The Author(s) 2024. **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

Introduction

Globally, musculoskeletal disorders (MSDs) are thought the second greatest contributor to disability [1]. The global prevalence of MSD alters depending on the type of profession, demographic characteristics, and tools used to responded symptoms. Musculoskeletal problems were encountered to various workers, especially those engaged in production work [2]. More than 160 million people annually suffer tasks-related distress according to The Workplace Safety and Health Institute [3]. Office workers have the most common musculoskeletal problems which is neck pain. The neck pain prevalence is constantly increasing, especially in middle-income and low-income countries, which enhances the effects on healthcare systems and negatively influences the quality of life of individuals [4].

Neck pain may be connected to various factors, such as physical activity, a person's functional level, work habits [5], repetitive movement, inadequate posture, and individual (age, BMI) [6]. MSD-related neck pain at work and in daily life is considered a major reason for disability and sickness, affecting approximately 34.4% of office employees worldwide each year [7]. A previous study investigated that office workers were at higher risk of increasing neck pain, and office employees had a much higher incidence rate per year than the general population [8]. Investigating physically hazardous factors connected to neck pain is important because they are possibly reversible with regular exercise-based interventions [9]. Some previous studies showed that neck pain was related with some associated factors. In China, in one study, subjects reporting neck pain [10] were associated with a bent neck and manual activities. In the USA, neck pain was related with morbidity, and married and separated men and women whose physical activity was protective and higher education level were considered factors [11]. Generally, neck pain is thought to be multifactorial, but it is unclear which factors, in particular, place office workers at higher risk [12].

The cervical pain prevalence and the risk ratio of people are prospective to increase over the following decade [13]. Although there has been previous research on the risk factors and incidence of neck pain associated with office work, no previous research has been conducted among office workers in the R&I department. Therefore, the incidence and risk factors of neck pain in this specific category of employees remain unknown. Research was needed to better understand neck pain and to explore more specific and new causes. The present study aimed to identify the prevalence and causes of neck pain among Bangladeshi R&D department office workers in the private industry.

Materials and methods

Study design and participants

The study was conducted as a cross-sectional study from May 2023 to December 2023. Data were collected from a total of 384 employees who were active and apparently healthy at work and aged between 18 and 55 years. Dhaka and Gazipur are two big and popular cities of Bangladesh, and R&D office workers of various private industries are a prominent population in the region.

Source and study population

The study population was the office staff of research and development departments of various private manufacturing and technological industries in Dhaka and Gazipur cities which was the source population. Employees, who had worked for a minimum of 1 year or more, are included in this survey. However, employees with traumatic injuries, other birth defects, spinal deformities (such as kyphosis, excessively flat neck, etc.), or inflammatory diseases affecting the body and musculoskeletal system were excluded from our research.

Determine sample size and procedures

The sample size was identified by applying a single population proportion formula, 5% margin of error, 95% confidence interval, and 50% standard deviation, resulting in 384 R&D office employees randomly selected from 16 private industries. Research and development department office staff of private industries was selected by a systematic random sampling technique.

Data measurement

Data for this investigation was collected through a face-to-face interview. A semi-structured questionnaire was initially developed in English and later converted into Bengali for data collection. After the questionnaire was translated, it was verified by another translator. However, for the convenience of respondents, the local language was used for communication. Then, an orientation was organized with 38 (10%) field tests among the participants, and finally, data was collected from the R&D employees through door-to-door questionnaires.

The project was conducted in Shyamoli, Dhanmondi, Mirpur, Chandra, Konabari, Sripur, Kaliakoir, Sofipur, and Baroipara areas of Dhaka and Gazipur City in Bangladesh. We collected information from the respondents with their permission. The investigator asked subjects only using Bengali language, "Do you have neck pain or

tenderness most of the time (currently or previously)?" A response was in the questionnaire for the neck of the box (no and yes).

Statistical analysis

The χ^2 test was performed to evaluate the association of neck pain with various risk factors. All reports were rechecked for accuracy, completeness, and internal consistency. Inappropriate and unacceptable data were discarded, and suitable data were entered into SPSS version 25 for evaluation. Logistic regression was performed in our study to assess specific neck pain prevalence among participants and risk factors related with pain. Neck pain was differentially regressed against work-related and sociodemographic factors. Before the logistic regression was determined, first, testing the model was done using the Hosmer and Lemeshow test, and the hypothesis was satisfied (p -value > 0.05).

Data quality control

During the period of data collection, each completed and fulfilled questionnaire was checked by the principal author for consistency and completeness. The principal investigator was obligated to conduct regular meetings with the data collectors at each site and supervised them throughout the data collection period.

Results

We collected a total of 410 data from eligible individuals through interviews, but ultimately 384 were selected for data analysis. The main reasons for exclusion or rejection ($n = 26$) were "not meeting inclusion criteria" and "interview session was long hence incomplete questionnaire."

Sociodemographic characteristics of the study respondents

The majority of respondents in this study were males 201 (52.3%). The mean (\pm SD) age of the participants was 36.50 ± 9.94 years, and a maximum of 44.3% of the participants were 30–39 years old. A third of the total population of 384 was 33.6% with a bachelor's degree. Most of the respondents were married (70.3%). Regarding specific work experience, 59.9% of respondents had experience less than 10 years, 24% had 10–20 years of experience, and 16.1% had more than 20 years of experience (Table 1).

Pain-related characteristics

This study illustrates that the neck pain prevalence among research and development department staff of private industry in Bangladesh was 137 (35.7%). In addition, 27.6% of the employee had neck pain affecting their capability to

Table 1 Sociodemographic characteristics of respondent ($n = 384$)

Characteristics	Male		Female		Overall	
	Freq.	%	Freq.	%	Freq.	%
Sex	201	52.3	183	47.7	384	100
Age group (in years)						
Below 29	47	12.2	49	12.8	96	25
30–39	87	22.7	83	21.6	170	44.3
40 and above	67	17.4	51	13.3	118	30.7
Mean age in years (mean \pm SD)	37.31 \pm 10.211		35.61 \pm 9.60		36.50 \pm 9.94	
Height in cm (mean \pm SD)	167.81 \pm 3.281		160 \pm 2.52		164.35 \pm 4.66	
Weight in kg (mean \pm SD)	66.63 \pm 6.095		60.54 \pm 6.88		63.73 \pm 7.15	
Education qualification						
Primary	6	1.6	10	2.6	16	4.2
SSC level	42	10.9	32	8.3	74	19.3
HSC or diploma	42	10.9	37	9.6	79	20.6
Graduation	68	17.7	61	15.9	129	33.6
Masters to above	43	11.2	43	11.2	86	22.4
Marital status						
Single	55	14.3	59	15.4	114	29.7
Married	146	38	124	32.3	270	70.3
Specific work experience						
Less than 10 years	112	29.2	118	30.7	230	59.9
10–20 years	52	13.5	40	10.4	92	24
More than 20 years	37	9.6	25	6.5	62	16.1

do ordinary work even if it was for a minimum of 1 month during their working life (Table 2).

Computer working

In this investigation, 51.3% of the total respondents always use computers, and 15.4% sometimes use computers. The data suggests that a majority of the respondents (51.3%) always use computers, regardless of gender (Table 3).

Exercise-related characteristics

Table 4 illustrates that 19.6% of the total participants always exercise, 17.2% sometimes exercise, and 63.2% never exercise. Looking at the data by gender, the table shows that a slightly higher percentage of females (10.7%) always exercise compared to males (8.9%).

Factors associated with neck pain

This outcome presents that individuals aged 40 to above were also more likely to have neck pain, with an OR of 6.148 ($p = 0.046$), while those in the 30–39 age group were

also more likely to experience neck pain, with an OR of 6.493 ($p = 0.144$). The results of BMI indicated that those with normal weight were significantly less likely to have neck pain than those who were underweight ($p < 0.001$). Educational qualification was also found to be significantly associated with neck pain. Individuals with HSC or diploma education were most significantly to realize neck pain, with an OR of 15.600 ($p = 0.020$), while those with graduate-level education had an OR of 3.429 ($p = 0.154$). Those who often worked on computers were more significantly to have neck pain, with an OR of 8.801 ($p = 0.078$) for those who sometimes worked on computers and an OR of 1.346 ($p = 0.812$) (Table 5).

One-sample statistics and test for respondent height

The mean value (\pm SD) for height of male 167.81 ± 3.281 has strongly significantly different than the population mean ($t = 17.308, p = 0.000$). And also, we can see that the mean value (\pm SD) for height of females (160.56 ± 2.521) is strongly significantly different than the population mean ($t = 52.455, p = .000$) (Table 6).

Table 2 Pain-related characteristics of study from survey where survey data ($n = 384$)

Characteristics	Gender	Yes	Percentage	No	Percentage
Pain experience in neck pain at job life	Male	71	18.5	130	33.8
	Female	66	17.2	117	30.5
	Total	137	35.7	247	64.3
Taking any treatment procedure for pain	Male	54	14.1	147	38.3
	Female	54	14.1	129	33.6
	Total	108	28.1	276	71.9
Pain affects your daily activities	Male	51	13.3	150	39.1
	Female	55	14.3	128	33.3
	Total	106	27.6	278	72.4

Table 3 Computer working

Sex	Always		Sometimes		Never	
	Freq.	%	Freq.	%	Freq.	%
Male	103	26.8	29	7.6	69	18
Female	94	24.5	30	7.8	59	15.4
Total	197	51.3	59	15.4	128	33.3

Table 4 Exercising regularly

Sex	Always		Sometimes		Never	
	Freq.	%	Freq.	%	Freq.	%
Male	34	8.9	37	9.7	129	33.7
Female	41	10.7	29	7.6	113	29.5
Total	75	19.6	66	17.2	242	63.2

Table 5 Odds ratios (ORs) with 95% confidence interval (CI) and *p*-values obtained from the logistic regression model for predicting factors associated with neck pain

Characteristics	Coefficients	<i>p</i> -value	OR	95% CI	
				Lower	Upper
Sex					
Male (ref.)	1				
Female	− 8.33	0.086	.435	0.168	1.125
Age group					
Below 29 (ref.)	1	.137			
30–39	1.871	.144	6.493	.529	79.664
40 and above	1.816	.046*	6.148	1.030	36.703
BMI (kg/m²)					
Under weight (ref.)	1	.598			
Normal weight	− 19.104	.999	.000	.000	
Over weight	1.024	.858	2.783	.000	208329.39
Obese	.166	.977	1.181	.000	91955.4777
Education qualification					
Primary (ref.)	1	.074			
SSC level	.836	.651	2.307	.061	86.724
HSC or diploma	2.753	.020**	15.600	1.538	160.071
Graduation	1.232	.154	3.429	.629	18.682
Masters to above	− .6222	.321	.537	.157	1.834
Marital status					
Single (ref.)	1				
Married	− .652	.463	.521	.091	2.970
Specific work experience					
Less than 10 years (ref.)	1	.491			
10–20 years	.353	.740	1.423	.177	11.406
More than 20 years	− .436	.633	.647	.108	3.863
Computer working					
Always	1	0.091			
Sometimes	2.175	.078	8.801	.781	99.154
Never	.297	.812	1.346	.116	15.627
Exercising regularly					
Always	1	.687			
Sometimes	.047	.940	1.048	.308	3.561
Never	.529	.392	1.697	.505	5.701

Table 6 One-sample statistics and test for respondent height

Height	Test value	(mean ± SD)	<i>t</i>	df	Sig. (2-tailed)	Mean difference	95% CI of the difference	
							Lower	Upper
Male	163.80	167.81 ± 3.281	17.308	200	0.000	4.006	3.55	4.46
Female	150.78	160.56 ± 2.521	52.455	182	0.00	9.777	9.777	10.15

Table 7 One-sample statistics and test for respondent weight

Weight	Test value	(mean \pm SD)	t	df	Sig. (2-tailed)	Mean difference	95% CI of the difference	
							Lower	Upper
Male	55.2	66.63 \pm 6.095	33.560	200	0.000	14.427	13.58	15.27
Female	49.8	60.54 \pm 6.887	21.097	182	0.000	10.741	9.74	11.75

One-sample statistics and test for respondent weight

We can see that the mean value (\pm SD) for weight of males (66.63 \pm 6.095) is strongly significantly different than the population mean ($t = 33.560$, $p = 0.000$). And also, we can see that the mean value (\pm SD) for weight of females (60.54 \pm 6.887) is strongly significantly different than the population mean ($t = 21.097$, $p = .000$) (Table 7).

Discussion

Various sociodemographic characteristics and work-related factors were connected with neck pain, particularly among research and development sector office staff working with computers. Various previous investigations have considered physiological and mental work factors when studying neck (cervical) pain [14]. Overall, other factors were associated with cervical pain, including both psychosocial and physical factors. In our research, the neck pain prevalence was high: 35.7% of participants reported chronic neck pain. Previous neck pain was reported in several studies. The percentage of our study is higher than that reported in investigations from Hong Kong (22.3%) [15], Greece (20.4%) [16], Brazil (24.0%) [17], and Spain (19.5%) [18], while it is lower than that found in Sri Lanka (56.9%) [19] and China (48.7%) [10].

This study indicated that neck pain affected the daily activities of 27.6% of the total sample, with a slightly higher percentage of women (14.3%) than men (13.3%) affecting their daily activities, which is related with previously organized in Korean studies [20]. Furthermore, because the evaluations were limited to currently employed research and development office employees, we excluded employees who had previously worked or left the job due to musculoskeletal pain. The effect of this potential selection bias could not be assessed, but the duration of employment in the current job greater than 1 year suggests that the study was conducted in a stable population. The study found that women had an OR of 0.435, indicating that they were less likely to experience neck pain than men.

The significant characteristic in our study is the age group. Results indicated that individuals aged 30–39 years were more likely to experience neck pain, with an OR of 6.493 ($p = 0.144$), whereas individuals aged 40 years and older were significantly more likely to

experience neck pain, with an OR of 6.148 ($p = 0.046$), which correlates with previous studies showing an increased risk of developing cervical pain in the 35–49-year age group [21]. The results of BMI indicated that those with normal weight were significantly less likely to have neck pain than those who were underweight ($p < 0.001$). In contrast, individuals who often worked on a computer were significantly more likely to experience neck pain, with an OR of 8.801 ($p = 0.078$) for those who sometimes worked on a computer and an OR of 1.346 ($p = 0.812$) for those who never worked on a computer, which is related prior China studies [22]. Educational qualification was also found to be significantly associated with neck pain. Individuals with HSC or diploma education were most significantly to realize neck pain, with an OR of 15.600 ($p = 0.020$). Since most employees of this educational qualification are involved in computer operator or data entry operator in Bangladesh [23], they may be considered to be associated with neck pain. Work experience and exercise were not associated with neck pain.

Conclusions

This study discovers that the prevalence of neck pain was high among R&D workers in private industry. It indicated that age, educational qualification, and those who often work on computers were more likely to have neck pain. These research findings also suggest scope for work strategies that can improve an ergonomic setting or a positive work environment, such as short breaks during computer work. In this way, to better realize the issue, hereafter research could include different workforces from larger populations and with various background characteristics.

Abbreviations

R&D	Research and development
OR	Odds ratio
p -value	Probability value
WHO	World Health Organization
BMI	Body mass index
HSC	Higher Secondary Certificate
MSDs	Musculoskeletal disorders
NIMH	National Institute of Mental Health
US	United States
CI	Confidence interval
SPSS	Statistical Package for the Social Sciences
SSC	Secondary School Certificate
SD	Standard deviation

Acknowledgements

Special thanks and respect are given to Almighty Allah for granting us high opportunities to fulfill this research. We give the heartiest respect to the respondents for responding to our study. We also respect our family members for helping and inspiring our study.

Data access, responsibility, and analysis

The correspondent or principal author receives responsibility for the completeness of the data and the validity of the data analysis, and he has total access to all investigation data.

Authors' contributions

MOSAC planned and proposed the paper and conducted the data evaluation and research. MOSAC and MRK analyzed and interpreted the data using tools. ANMR, NH, and SI wrote the initials of the article and checked for accuracy. MOSAC and MRK wrote the final draft of the paper. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

Funding

This study did not accept any grants from the non-profit, private, public, commercial sector, or organization funding bodies.

Availability of data and materials

This facilitates discovery from research; such data is for logical reasons and will be made available from the principal author. The data is not publicly available due to the limitation that the study concerns the privacy of the respondents and may cause disruptions or problems at work.

Declarations

Ethics approval and consent to participate

Our study was approved by the Research Ethics Committee of the Center for Multidisciplinary Research, Gono Bishwabidyalay, Bangladesh, and with approval number from the Ethics Committee: CMR/EC/009. The objectives of the study were clearly explained to the participants. The researchers assured the respondents that the data would be used only for research purposes, protecting their privacy. All forms of privacy are guaranteed, and they can be withdrawn or can participate at any time.

Competing interests

The authors declare no competing interests.

Author details

¹Department of Public Health, Daffodil International University, Dhaka, Bangladesh. ²Medical Service, Administration Department, Walton Group, Gazipur, Dhaka, Bangladesh. ³Gonoshasthaya Samaj Vittik Physiotherapy College, Savar, Dhaka, Bangladesh. ⁴Bangladesh Cricket Board, Dhaka, Bangladesh. ⁵Center for Disability in Development, Bhasanchar, Hatiya, Nuakhali, Bangladesh. ⁶Physiotherapy Department, Gono Bishwabidyalay, Dhaka, Bangladesh.

Received: 31 January 2024 Accepted: 5 June 2024

Published online: 25 September 2024

References

- James SL, Abate D, Abate KH, Abay SM, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet*. 2018;392:1789–858. [https://doi.org/10.1016/S0140-6736\(18\)32279-7](https://doi.org/10.1016/S0140-6736(18)32279-7).
- Chowdhury MSA, Huda N, Alam MM, et al. Work-related risk factors and the prevalence of low back pain among low-income industrial workers in Bangladesh: results from a cross-sectional study. *Bull Faculty Phys Ther*. 2023;28:20. <https://doi.org/10.1186/s43161-023-00132-z>.
- AlOmar RS, AlShamlan NA, Alawashiz S, et al. Musculoskeletal symptoms and their associated risk factors among Saudi office workers: a cross-sectional study. *BMC Musculoskelet Disord*. 2021;22:763. <https://doi.org/10.1186/s12891-021-04652-4>.
- Alhakami AM, Adel Madkhli, Ghareeb M. et al. The prevalence and associated factors of neck pain among Ministry of Health office workers in Saudi Arabia: a cross sectional study. *Healthcare (Basel)*. 2022, 10(7): 1320. <https://doi.org/10.3390/healthcare10071320>.
- Malchaire J, Roquelaure Y, Cock N, Piette A, Vergracht S, Chiron H. Musculoskeletal complaints, functional capacity, personality and psychosocial factors. *Int Arch Occup Environ Health*. 2001;74:549–57. <https://doi.org/10.1007/s004200100264>.
- Cimmino Marco A, Ferrone Carmela, Cutolo Maurizio. Epidemiology of chronic musculoskeletal pain. *Best Pract Res Clin Rheumatol*. 2011;25(2):173–83. <https://doi.org/10.1016/j.berh.2010.01.012>.
- Genebra CVD, Maciel NM, Bento TP, et al. Prevalence and factors associated with neck pain: a population-based study. *Br J Phys Ther*. 2017;21(4):274–80. <https://doi.org/10.1016/j.bjpt.2017.05.005>.
- Hush Julia M., Maher Chris G., Refshauge Kathryn M. Risk factors for neck pain in office workers: a prospective study. *BMC Musculoskelet Disord*. 2006;7:81. <https://doi.org/10.1186/1471-2474-7-81>.
- Jull G, Trott P, Potter H, Zito G, Niere K, Shirley D, Emberson J, Marschner I, Richardson C. A randomized controlled trial of exercise and manipulative therapy for cervicogenic headache. *Spine*. 2002;27:1835–43. <https://doi.org/10.1097/00007632-200209010-00004>.
- Yue P, Liu F, Li L. Neck/shoulder pain and low back pain among school teachers in China, prevalence and risk factors. *BMC Public Health*. 2012;12:789. <https://doi.org/10.1186/1471-2458-12-789>.
- Strine Tara W, Hootman Jennifer M. US national prevalence and correlates of low back and neck pain among adults. *Arthr Rheumatol*. 2007;57(4):656–65. <https://doi.org/10.1002/art.22684>.
- Linton SJ. A review of psychological risk factors in back and neck pain. *Spine*. 2000;25:1148–56. <https://doi.org/10.1097/00007632-200005010-00017>.
- Hoy D, March L, Woolf A. The global burden of neck pain: estimates from the Global Burden of Disease 2010 study. *Ann Rheum Dis*. 2014;73:1309–15. <https://doi.org/10.1136/annrheumdis-2013-204431>.
- Somaye Kazeminasab, Seyed Aria Nejadghaderi, Parastoo Amiri, Hojjat Pourfathi et al. Neck pain: global epidemiology, trends and risk factors. *BMC Musculoskelet Disord*. 2022; 23: 26. <https://doi.org/10.1186/s12891-021-04957-4>.
- Lloyd Long Yu Chan, Arnold Yu Lok Wong, Maggie Haitian Wang et al. The prevalence of neck pain and associated risk factors among undergraduate students: a large-scale cross-sectional study. *Int J Industrial Ergonomics*. 2020; 76: 102934. <https://doi.org/10.1016/j.ergon.2020.102934>.
- Stranjalis G, Kalamatianos T, Stavrinou LC, Tsamandouraki K, Alamanos Y. Neck pain in a sample of Greek urban population (fifteen to sixty-five years): analysis according to personal and socioeconomic characteristics. *Spine*. 2011;36(16):E1098–104. <https://doi.org/10.1097/BRS.0b013e3182054add>.
- Ferreira GD, Silva MC, Rombaldi AJ, Wrege ED, Siqueira FV, Hallal PC. Prevalência de dor nas costas e fatores associados em adultos do Sul do Brasil: estudo de base populacional. *Revista Brasileira de Fisioterapia*. 2011;15(1):31–6.
- Fernández-de-las-Peñas C, Hernández-Barrera V, Alonso-Blanco C. Prevalence of neck and low back pain in community-dwelling adults in Spain: a population-based national study. *Spine*. 2011;36(3):E213–9. <https://doi.org/10.1097/BRS.0b013e3181d952c2>.
- Ranasinghe P, Perera YS, Lamabadusuriya DA. Work related complaints of neck, shoulder and arm among computer office workers: a cross-sectional evaluation of prevalence and risk factors in a developing country. *Environ Health*. 2011;10:70. <https://doi.org/10.1186/1476-069X-10-70>.
- Kyeong Min Son, Nam H Cho, Seung Hun Lim, Hyun Ah Kim. Prevalence and risk factor of neck pain in elderly Korean community residents. *J Korean Med Sci*. 2013;28(5):680–6. <https://doi.org/10.3346/jkms.2013.28.5.680>.
- Hoy DG, Protani M, De R, Buchbinder R. The epidemiology of neck pain. *Best Pract Res Clin Rheumatol*. 2010;24(6):783–92. <https://doi.org/10.1016/j.berh.2011.01.019>.

22. Sunyue Ye, Qinglei Jing, Chen Wei, Jie Lu. Risk factors of non-specific neck pain and low back pain in computer-using office workers in China: a cross-sectional study. *BMJ Open*. 2017 11;7(4):e014914. <https://doi.org/10.1136/bmjopen-2016-014914>.
23. Bdjjobs.com. Data entry, computer operator, BPO jobs in Bangladesh, 2023 | Available on: <https://jobs.bdjjobs.com/JobSearch.asp?catid=15>.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.