The role of work- related physical and psychological factors on prevalence of neck/shoulder complaints among nurses: A multicentric study

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Abstract

Background: Identifying the predisposing factors of neck and shoulder complaints and finding solutions to avoid them could improve the occupational health condition of the nurses. In this study, we aimed at determining the role of psychological and physical occupational factors in developing neck and shoulder complaints among the participants.

Methods: This analytic cross-sectional study was conducted on the nurses of main hospitals of Tehran. To study the prevalence of neck and shoulder pain, the Nordic questionnaire was used, and job content questionnaire was used to assess the psychological and physical occupational factors. Data were analyzed using SPSS and statistical methods. Independent sample t-test was used to compare the qualitative variables, and chi-square test was utilized for the statistical analysis of the qualitative variables.

Results: Prevalence of neck and shoulder complaints among the nurses with high physical workload was significantly higher than in those nurses with low physical workload. Unlike physical workload, the prevalence of neck and shoulder complaints was not significantly different between the nurses with low or high psychological workload. Prevalence of neck and shoulder complaints among the female nurses was significantly higher than in the male nurses. In our study, only female nurses with high physical workload had been known as independent predictors of neck and shoulder complaints.

Conclusion: Those nurses who had more workload, especially physical workload, had a higher prevalence of neck and shoulder complaints, and this fact could affect their work tasks.

Keywords: Neck Complaint, Nurses, Physical Factors, Psychological Factors, Shoulder Complaints.

Introduction

Musculoskeletal disorders (MSD) are considered a work-related burden for occupational societies and national health policymakers. Occupational specialists try to find accessible and feasible preventive programs to control its burden (1-6). MSD impacts the industries more than the workers, and the noted impact had been over presented in developing countries due to poor working conditions and lack of local or national effective MSD preventive programs (7). Nurses are one of the at risk groups who provide direct healthcare services to patients. Previous studies have reported that patient handling is a significant contributor to musculoskeletal disorders, especially in the back, neck, and shoulders regions, among the nurses and nurses' aides (8,9).

Physical factors such as repetitive tasks

and awkward positions, and psychological factors such as work- related stress, satisfaction, and burnout had been reported in the previous studies as contributing factors more than age, gender, and psychological characters as personal risk factors in developing MSD in workers at their workplace (7,10,11). Most previous studies in this filed focused on back injuries and musculoskeletal disorders of workers in the healthcare (12,13) and other industries (6, 14-16). Despite these facts, few studies have examined which of the wide spectrum of risk factors are predictive of MSD in the nursing profession. It is important for the policymakers to investigate factors that relate to MSD among the nurses and take the necessary measures to prevent such conditions to protect nurses' health and the quality of the healthcare services they provide to patients. Despite their large demographic and associated potential for occupational health problems, few epidemiological studies have investigated MSD risk factors among Iranian nursing professionals (6,8, 9). The present study was performed to assess the role of work- related physical and psychological factors on prevalence of neck/shoulder complaints among Iranian nurses in 10 main hospitals in Tehran.

Methods

The present cross-sectional study was conducted on nurses of 10 hospitals of Iran University of Medical Sciences in Tehran that provided special and super special healthcare services to patients from March 2014 to March 2015. The study protocol was approved at research ethical committee of Iran University of Medical Sciences. The participants were selected from all of the nurses of the studied hospitals according to their bed and number of patients via stratified sampling. We divided hospitals into 2 stratifies according to their health care services. Then the study samples were selected through simple random sampling within each stratum. According to the sample size formula (p=0.5, d=0.005 and α=95%), we need 384 nurses, and we added around 30%

as a fraction rate (due to non-attendance and other causes), and finally we included 512 nurses. The participants had at least a year of job experience without any history of primary lesions in their musculoskeletal system including neck, shoulder, lumbar, and upper and lower limbs.

The Study Questionnaires

We used two questionnaires in the present study. Firstly, we used the Nordic Musculoskeletal Questionnaire (NMQ) to determine the prevalence of neck and shoulder complaints among the participants. NMQ was developed from a project funded by the Nordic Council of Ministers (17). The aim was to develop and test a standardized questionnaire methodology, allowing the comparison of low back, neck, shoulder, and general complaints to be used in epidemiological studies. The tool did not develop for clinical diagnosis. This questionnaire can be used as questionnaire or interview devices (18). The NMQ has been used in several studies to evaluate musculoskeletal problems including computer and call center workers (19), car drivers (20), and coopers industry (21). Previous studies reported that the NMQ is repeatable, sensitive, and useful as a screening and surveillance tool. However, medical examination is essential to establish a clinical diagnosis (22,23).

We used job content questionnaire to assess the role of physical and psychological factors on the prevalence of neck and shoulder complaints among the nurses. Job content questionnaire had some subdomains in assessing the role of work- related psychological and physical components. In the noted questionnaire, 12 questions were related to physical and 8 to psychological components. Questions were scored on a Likert scoring system from completely agree to completely disagree. Answers to questions of physical components were scored in 2 levels between 0 and 12. Finally, the scores of physical components were divided into 2 groups of low/middle physical pressure (0-9), and high physical pres-

sure (10-12). Scores of psychological pressure were between 0 and 8. We divided psychological scores into 2 groups of low psychological pressure (0-5), and high psychological pressure (6-8) (24,25). Job contents questionnaire had a valid Persian version with Cronbach alpha of between 0.64 and 0.85 (26).

Statistical Analysis

Data were entered into the SPSS software. Mean/standard deviation and frequency/percentages were used for descriptive analysis of qualitative and qualitative variables, respectively. Independent sample t-test was used to compare qualitative variables, and chi-square test was used for the statistical analysis of qualitative variables. P-values less than 0.05 were considered significant.

Results

Finally, from 512 distributed questionnaires among the study nurses, 405 questionnaires came back to the investigators (response rate: 79%). Mean±SD of age and job experience among the study participants were 42±6.5 (range: 22-60) and 20.7±6.5 (range: 2-40) years, respectively. Most of the nurses were married (n = 383, 95%). Mean±SD of BMI among the participants was 25.9 ±9.31kg/m^2 (15.8-49). More details of demographic variables are demonstrated in Table 1.

The prevalence of neck and shoulder complaints among the nurses was 21% and 21.5% in the recent week, and 32.6% and 29.9% in the recent year, respectively. The prevalence of neck pain in the female nurses was significantly higher than in male nurses (37.5% vs. 27.4%; p=0.03, OR: 1.58, 95% CI:1.04-2.42). The prevalence of neck complaint in the recent year was not

Table 1. Comparing Demographic Variables between the Participants (n=405)

Variable	Category	
Sex	Male (%)	48.6%
	Female (%)	51.4%
Age	Mean±SD	42.08±6.59
	Range	26-60
BMI	Mean±SD	25.9±3.9
	Range	15.8-49
Work experience	Mean±SD	20.7±7.6
	Range	2-40
Work hours per week	Mean±SD	27.2±5.8
	Range	15-50
Marital status	Single (%)	4.3%
	Married (%)	95.7%
Hospital types	Specific (%)	49.4%
	Super specific (%)	50.6%

statistically significant among the married and single nurses (33.1% vs. 17.6%; p=0.4). The prevalence of neck complaints was similar between nurses of special and super special hospitals (34% vs. 31.2%; p=0.55, OR:0.88, 95% CI:0.58-1.33). The prevalence of shoulder pain among the female nurses was significantly higher than in the male nurses (35.1% vs. 24.3%; p=0.01, OR:1.68, 95% CI:1.09-2.59). The prevalence of shoulder complaint in the recent year was not statistically different between the married and single nurses (31.1% vs. 5.9%; p=0.03; OR:5.28, 95% CI:0.78-35.59). The prevalence of shoulder complaints was similar in the nurses of special and super special hospitals (29.5% vs. 30.2%; p=0.87, OR:1.03, 95% CI:0.68-1.58).

The mean of age and work experience among the nurses with neck or shoulder complains was significantly higher than in nurses without neck or shoulder complaints. The mean of BMI and work hours per week was not significantly different between the nurses with and without neck or shoulder pain in the last year (Table 2).

Among the nurses, 88.6% and 11.4% had low and high physical workload, respec-

Table 2. Comparing the Study Variables between the Nurses with and without Neck/Shoulder Complaints

Study Variables	Neck Complaint			Shoulder Complaint		
	Positive	Negative	p	Positive	Negative	p
Age	44.17±6.39	41.06±6.45	<0.001	44.82±6.18	40.91±6.42	<0.001
BMI	27.37±15.29	25.85±3.94	0.12	26.18±3.20	26.42±10.92	0.81
Work experience	23.19±6.84	20.47±6.64	<0.001	23.80±6.92	19.44±7.57	<0.001
Work hours per week	27.56±5.70	27.09±5.98	0.46	27.63±5.99	27.24±5.89	0.81

tively. With respect to psychological workload, 75.8% and 24.2% of the nurses had low and high psychological workload in their workplaces, respectively. The mean of age, BMI, work experience, and working hours per week was not significantly different between the nurses with low and high physical and psychological workload.

The prevalence of neck complaints among the nurses with high physical workload was significantly higher than in nurses with low physical workload (52.1% vs. 30%; p=0.11, OR:2.5, I95% C:1.37-4.74). Unlike physical workload, the prevalence of neck complaints was not significantly different between nurses with low or high psychological workload (38.7% vs. 30.6%, p=0.12). The prevalence of shoulder complaints among the nurses with high physical workload was significantly higher than in those nurses with low physical workload (50% vs. 27.2%; p=0.02, OR:2.6, 95% CI: 1.44-4.99). Unlike physical workload, the prevalence of shoulder complaints was not significantly different between the nurses with low or high psychological workload (36.1% vs. 27.5%, p=0.11). The results of logistic regression model in our study revealed that among the included variables, only female gender (OR:2.2, 95% CI:1.3-3.7) and high physical workload (OR:1.2 95% CI:1.06-1.3) had an independent impact on the prevalence of neck complaints. Moreover, female nurses (OR:2.8 95% CI:1.7-4.8) and those nurses with high physical workload (OR:1.2, 95% CI:1.07-1.32) were independent predictors of shoulder complaints among the nurses.

Discussion

The prevalence of neck and shoulder complaints among the nurses with high physical workload was significantly higher than in nurses with low physical workload. Unlike physical workload, the prevalence of neck and shoulder complaints was not significantly different between the nurses with low or high psychological workload. The prevalence of neck and shoulder complaints among the female nurses was signif-

icantly higher than in the male nurses. In our study, only the female nurses with high physical workload were independent predictors of neck and shoulder complaints. Our study was designed to find the relations between neck/shoulder complaints and job demand among the nurses working in several hospitals with different work tasks. Our findings can help accept our hypothesis: "increase in job demands, especially workload is associated with neck and shoulder complaints among nurses". In a similar study in Nigeria, an increase in prevalence of musculoskeletal complaints was reported among the nurses (27). Similar results were found in nurses in American (28) and Chinese (29) studies.

The present study revealed that neck and shoulder pain was highly prevalent among the nurses. Neck and shoulder pain among the nurses might be due to recurrent lifting of heavy weights that these nurses experience in some hospital wards such as emergency situations while helping patients to be positioned on examination tables or preventing their falls (28,29). In our study, a strong association was found between the job demands and physical workload with musculoskeletal symptoms. On the other hand, the nurses with higher physical workload had significantly higher neck and shoulder complaints compared to other nurses. Our findings were similar with those of the previous studies on musculoskeletal disorders (30-32) and physical and mental health outcomes (33-36).

Our study had some limitations. First, due to the cross- sectional design of the study, we could not establish causal relationships between the study variables. Second, the relatively small sample size and potential selection bias might have also limited the validity and generalizability of the study findings to Iranian nurses as a national finding. Third, our analysis was based on self-report measures of job contents and neck/shoulder complaints. Common method variance may lead to bias inflating correlations between these variables, but unfortunately, we did not assess the common

method bias in our study.

Conclusion

Findings of the present study revealed that those nurses who more workload, especially physical workload, had a higher prevalence of neck and shoulder complaints and this fact could impact their work tasks. Conducting a longitudinal design to confirm our interpretation and use them in national preventive programs for healthcare workers is highly recommended.

References

1. Woolf AD, Akesson K. Understanding the burden of musculoskeletal conditions. The burden is huge and not reflected in national health priorities. BMJ 2001;322(7294):1079-80.
2. Spielholz P, Silverstein B, Morgan M, Checkoway H, Kaufman J. Comparison of self-report, video observation and direct measurement methods for upper extremity musculoskeletal disorder physical risk factors. Ergonomics 2001;44(6):588-613.
3. Aghilinejad M, Azar NS, Ghasemi MS, Dehghan N, Mokamelkhah EK. An ergonomic intervention to reduce musculoskeletal discomfort among semiconductor assembly workers. Work 2016;54(2):445-50.
4. Aghilinejad M, Bahrami-Ahmadi A, Kabir-Mokamelkhah E, Sarebanha S, Hosseini HR, Sadeghi Z. The effect of three ergonomics training programs on the prevalence of low-back pain among workers of an Iranian automobile factory: a randomized clinical trial. The international journal of occupational and environmental medicine 2014;5(2):65-71.
5. Aghilinejad M, Kabir-Mokamelkhah E, Labbafinejad Y, Bahrami-Ahmadi A, Hosseini HR. The role of ergonomic training interventions on decreasing neck and shoulders pain among workers of an Iranian automobile factory: a randomized trial study. Medical journal of the Islamic Republic of Iran 2015;29:190.
6. Aghilinejad M, Tavakolifard N, Mortazavi SA, Kabir Mokamelkhah E, Sotudehmanesh A, Mortazavi SA. The effect of physical and psychosocial occupational factors on the chronicity of low back pain in the workers of Iranian metal industry: a cohort study. Medical journal of the Islamic Republic of Iran 2015;29:242.
7. Musculoskeletal disorders and workplace factors: A critical review of epidemiologic evidence for workrelated musculoskeletal disorders of the neck, upper extremity, and low back.: Cincinnati (OH): NIOSH; 1997.
8. Fabunmi AA, Gbiri CA. Relationship between balance performance in the elderly and some anthropometric variables. African journal of medicine and medical sciences 2008;37(4):321-6.
9. Tinubu BM, Mbada CE, Oyeyemi AL, Fabunmi AA. Work-related musculoskeletal disorders among nurses in Ibadan, South-west Nigeria: a cross-sectional survey. BMC musculoskeletal disorders 2010;11:12.
10. Linton SJ, Kamwendo K. Risk factors in the psychosocial work environment for neck and shoulder pain in secretaries. J Occup Med 1989;31(7):609-13.
11. Bernard B. Musculoskeletal disorders and workplace factors: A critical review of epidemiologic evidence for work-related musculoskeletal disorders of the neck, upper extremity, and low back. Washington D.C: U.S. Government Printing Office (DHHS/NIOSH; 1997.
12. Hayes MJ, Taylor JA, Smith DR. Predictors of work-related musculoskeletal disorders among dental hygienists. International journal of dental hygiene 2012;10(4):265-9.
13. Smith DR, Leggat PA, Speare R. Musculoskeletal disorders and psychosocial risk factors among veterinarians in Queensland, Australia. Australian veterinary journal 2009; 87(7):260-5.
14. Aghilinejad M, Choobineh A, Sadeghi Z, Nouri M, Bahrami-Ahmadi A. Prevalence of Musculoskeletal Disorders among Iranian Steel Workers. . Iranian Red Crescent Medical Journal. 2012;14(4):198-203.
15. Aghilinejad M, Javad Mousavi SA, Nouri MK, Ahmadi AB. Work-related musculoskeletal complaints among workers of Iranian aluminum industries. Archives of environmental & occupational health 2012;67(2):98-102.
16. Aghilinejad M, Choobineh AR, Sadeghi Z, Nouri MK, Bahrami Ahmadi A. Prevalence of Musculoskeletal Disorders among Iranian Steel Workers. Iran Red Crescent Med J 2012;14(4):198-203.
17. Kuorinka I, Jonsson B, Kilbom A, Vinterberg H, Biering-Sorensen F, Andersson G, et al. Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. Appl Ergon 1987;18(3):233-7.
18. Crawford J. The Nordic Musculoskeletal Questionnaire. Occupational Medicine 2007;57:300-1.
19. Bergqvist U, Wolgast E, Nilsson B, Voss M. The influence of VDT work on musculoskeletal disorders. Ergonomics 1995;38(4):754-62.
20. Porter JM, Gyi DE. The prevalence of musculoskeletal troubles among car drivers. Occup Med (Lond) 2002;52(1):4-12.
21. Macdonald F, Waclawski E. Upper limb disorders among coopers in the Scotch whisky industry. Occup Med (Lond) 2006;56(4):232-6.
22. Ohlsson K, Attewell RG, Johnsson B, Ahlm A,

Skerfving S. An assessment of neck and upper extremity disorders by questionnaire and clinical examination. Ergonomics 1994;37(5):891-7.

23. Palmer K, Smith G, Kellingray S, Cooper C. Repeatability and validity of an upper limb and neck discomfort questionnaire: the utility of the standardized Nordic questionnaire. Occup Med (Lond). 1999;49(3):171-5.

24. Choobineh A, Rajaeefard A, Neghab M. Perceived demands and musculoskeletal disorders amon hospital nurses. Hakim Res J 2007; 10(2)(2):70-5.

25. Trinkoff AM, Lipscomb JA, Geiger-Brown J, Storr CL, Brady BA. Perceived physical demands and reported musculoskeletal problems in registered nurses. American journal of preventive medicine 2003;24(3):270-5.

26. Choobineh A, Ghaem H, Ahmedinejad P. Validity and reliability of the Persian (Farsi) version of the Job Content Questionnaire: a study among hospital nurses. East Mediterr Health J 2011; 17(4):335-41.

27. Tinubu B, Mbada CE, Oyeyemi AL, Fabunmi AA. Work-related musculoskeletal disorders among nurses in Ibadan, south-west Nigeria: A crosssectional survey. BMC musculoskeletal disorders 2010.

28. Trinkoff AM, Lipscomb JA, Geiger-Brown J, Brady B. Musculoskeletal problems of the neck, shoulder, and back and functional consequences in nurses. American journal of industrial medicine 2002;41(3):170-8.

29. Smith DR, Wei N, Zhao L, Wang RS. Musculoskeletal complaints and psychosocial risk factors among Chinese hospital nurses. Occup Med (Lond) 2004;54(8):579-82.

30. Gillen M, Yen IH, Trupin L, Swig L, Rugulies R, Mullen K, et al. The association of socioeconomic status and psychosocial and physical workplace factors with musculoskeletal injury in hospital workers. American journal of industrial medicine 2007;50(4):245-60.

31. Burgel BJ, White MC, Gillen M, Krause N. Psychosocial work factors and shoulder pain in hotel room cleaners. American journal of industrial medicine 2010;53(7):743-56.

32. Yu S, Lu ML, Gu G, Zhou W, He L, Wang S. Musculoskeletal symptoms and associated risk factors in a large sample of Chinese workers in Henan province of China. American journal of industrial medicine 2012;55(3):281-93.

33. de Jonge J, Bosma H, Peter R, Siegrist J. Job strain, effort-reward imbalance and employee well-being: a large-scale cross-sectional study. Social science & medicine 2000;50(9):1317-27.

34. Li J, Yang W, Cho SI. Gender differences in job strain, effort-reward imbalance, and health functioning among Chinese physicians. Social science & medicine 2006;62(5):1066-77.

35. Maina G, Bovenzi M, Palmas A, Prodi A, Filon FL. Job strain, effort-reward imbalance and ambulatory blood pressure: results of a cross-sectional study in call handler operators. International archives of occupational and environmental health 2011;84(4):383-91.

36. Wang J, Smailes E, Sareen J, Schmitz N, Fick G, Patten S. Three job-related stress models and depression: a population-based study. Social psychiatry and psychiatric epidemiology 2012; 47(2):185-93.