An Investigation of the Prevalence of Musculoskeletal Pain in Medical Staff in Three University Hospitals of Tehran, Iran: A Cross-Sectional Study

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Abstract
Background: Musculoskeletal disorders (MSDs) are among the most common work-related illnesses especially in medical personnel. Regarding the socioeconomic significance of this issue, it has been frequently studied worldwide. Many factors such as demographic and work-related factors are shown to be contributing to these disorders, but they vary in different countries and settings.
Methods: This descriptive cross-sectional study aimed to evaluate the prevalence of musculoskeletal (MSK) pain in medical staff in 3 university hospitals in Tehran, Iran, in 2019. The questionnaire containing personal demographic data and also a modified version of the Nordic MSK Questionnaire (NMQ) was used; descriptive and analytic data processing (313 participants included) was performed via SPSS software.
Results: The data showed that MSK pain was highly prevalent in medical staff in university hospitals (67% in the last year); and the most common regions of pain were reported to be the lower back (45.0%), neck (38.3%), knee (34.5%), and shoulder (32.6%). Also, an association was revealed between MSK pain during the last week and the last year and also daily functional impairment due to MSK pain during the last year and the variables such as female gender, lack of routine weekly physical activity, educational degree of Bachelor of Science (BS), lack of job satisfaction, and the hospital of employment.
Conclusion: This study emphasizes the high prevalence and the socioeconomic significance of MSK symptoms in medical personnel, suggests providing more facilitation in the workplace, so that ergonomic principles could be applicable alongside educating the personnel on these preventive methods.

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Introduction

Work-related musculoskeletal disorders (MSDs) account for the majority of all work-related illnesses and a significant portion of all work-related health costs.[1-4] These disorders cause a significant socioeconomic burden on the worker, employer, healthcare system, and the society in general.[1,5] On the other hand, MSDs are of the most important occupational health issues in medical personnel worldwide[6-10] and are known to be the most common cause of sick leaves in this group.[11,12] Regarding its high physical and psychological demand, nursing is among the most exposing jobs for these disorders,[2,3,13] as it was ranked the second (after industrial jobs) in the order of physical workload.[14,15]

Many known risk factors are contributing to MSDs, such as ergonomic and socioeconomic factors, workload and stress; and also individual physical and demographic characteristics. Despite the numerous and various studies on this subject, workplace-specific studies can lead to a more accurate and informative perception in health care system management and planning.[16]

As a common cause of morbidity in health care system personnel, MSDs have been widely studied in many countries and different occupational groups.[7-9,14,17,18]

In 2014, Freimann et al. reported the prevalence of MSDs as high as 84% "in the last year" and 69% "in the last month" in 221 female nurses in Estonia.[19] The systematic review by Soylar and Ozer compared the MSD prevalence in health care personnel in different countries: Brazil 93%, Turkey 90%, Nigeria 85%, Mexico 76%, Japan 70%, Canada 66%, and the United States of America (USA) 60%. They calculated an overall MSD prevalence of 73% in the nurses "during the last year".[4]

In the majority of the studies, the 3 most frequently reported painful regions were the back, neck, and shoulder.[10,20,21] In a study by Attar, the prevalence of MSD symptoms was calculated as high as 85% among 200 nurses in Saudi Arabia, and the most common painful regions were reported as lower back, ankle/feet, and shoulder.[17]

The present study was aimed at evaluating the MSD prevalence in health care personnel in 3 university hospitals in Tehran, Iran, as they are known to have a higher workload.

Methods

This descriptive cross-sectional study was conducted in three medical centers affiliated to Shahid Beheshti University of Medical Sciences, Tehran (Shohadaye Tajrish, Loghman, and Shahid Modarres) in 2019. The data were collected by distributing a questionnaire which was developed for this study (attached as the appendix file) and included 2 sections: personal demographic data [age, gender, marital status, body mass index (BMI), years of employment, history of previous MSD, routine weekly exercise, mean working hours per week, mean working hours (sitting/standing) per day, self-report job satisfaction] and also contained a modified and translated version of the Nordic Musculoskeletal Questionnaire (NMQ) [evaluating the history of musculoskeletal (MSK) pain in any of the 9 anatomical regions during the last week/year, seeking medical consult, functional impairment due to MSK pain, etc]. Its validity and reliability were evaluated through face validation, pilot study, and the Cronbach's α calculated via SPSS.

A total of 380 copies were distributed among the medical personnel [nurses, nurse aids, operating room (OR) technicians, etc] in these three hospitals. Data analysis was performed via SPSS software (version 22, IBM Corporation, Armonk, NY, USA) using independent t-test and chi-square test ($P < 0.05$) alongside descriptive analysis.

This research was approved by the Ethics Committee of Shahid Beheshti University of Medical Sciences with the following code: IR.SBMU.RETECH.1398.019. The information gathered from the participating physicians remained private and was only used in this study. The verbal form of "consent to participate" was used - as the participants

were directly contacted and explained to - which was accepted by the Ethics Committee of Shahid Beheshti University of Medical Sciences.

Results

Of 380 questionnaires distributed in the 3 hospitals, 313 copies (82.0%) were completed and returned (Table 1). The majority of the participants were working in the OR (21.7%), surgical wards (15.0%), internal medicine wards (14.4%), intensive care unit (ICU) (13.4%), emergency room (ER) (8.3%), cardiology, and coronary care unit (CCU) (7.1%).

Table 1. Distribution of participants in each hospital

Hospital	n (%)
Shohadaye Tajrish	177 (56.5)
Loghman	68 (21.7)
Modarres	67 (21.4)

As the demographic data analysis showed, 72.1% of the subjects were women, 73.8% aged between 25-45 years, 61.3% were married, and 51.4% had no children. The educational degree was reported as Bachelor of Science (BS) or higher in 79.0%, 43.8% declared to have job satisfaction, and 26.2% had a routine weekly physical activity (at least 150 minutes). There was no history of MSDs before employment in 93.0% and 14.1% were diagnosed with at least one type of these illnesses at that time (Table 2).

Table 2. Descriptive data of numeric variables

Variable	Mean ± SD
BMI	23.7 ± 5.6
Years of employment	12.2 ± 7.5
Working hours per week	185.3 ± 12.8
Sick leaves due to MSD during the last year	8.8 ± 2.9
Standing working hours per day	7.9 ± 6.5
Sitting working hours per day	2.2 ± 2.3
Mobile phone use hours per day	1.6 ± 1.3

BMI: Body mass index; MSD: Musculoskeletal disorder; SD: Standard deviation

Of note, 37.4% of the participants had attended ergonomic education programs but 71.9% considered their work environment to be "inappropriate" for application of the programs. Also, 63.3% preferred workshops over handbooks for obtaining ergonomic education.

The data showed that 72.2% reported MSK pain in any of the nine anatomical regions during the past week and 67.4% during the past year. The most common regions of MSK pain were reported as the lower back (45.0%), neck (38.3%), knee (34.5%), and shoulder (32.6%) (Table 3).

Table 3. Descriptive data of the anatomical regions of pain complaints

Anatomical region of pain complaint	n (%)
Neck	120 (38.3)
Shoulder	102 (32.6)
Back	89 (28.4)
Elbow	32 (10.2)
Wrist/hand	83 (26.5)
Lower back	141 (45.0)
Hip	53 (16.3)
Knee	108 (34.5)
Ankle/foot	88 (28.1)

In 46.0%, MSK pain caused daily functional impairment in the past year, while 33.2% sought medical consults for this matter, 31.3% had medication consumption, 19.8% went through imaging studies, and 17.9% went through laboratory workup. Moreover, 12.1% of the participants took at least one day of sick leave because of MSK pain during the past year (Table 4).

Table 4. Descriptive data of nominal variables

Variable	n (%)
MSK pain during the last week	226 (72.2)
MSK pain during the last month	211 (67.4)
Daily function impairment due to MSK pain during the last year	144 (46.0)
Sick leave due to MSK pain during the last year	38 (12.1)
Medical consult due to MSK pain during the last year	104 (33.2)
Medication consumption due to MSK pain during the last year	98 (31.3)
Imaging studies due to MSK pain during the last year	62 (19.8)
Laboratory workup due to MSK pain during the last year	56 (17.9)

MSK: Musculoskeletal

This study revealed that MSK pain during

the last week and the last year and also daily functional impairment due to MSK pain in the medical staff were associated with gender, routine weekly physical activity, education degree, job satisfaction, and the hospital of employment (as it showed higher prevalence in female personnel, those with lack of routine physical activity, BS degree, lack of job satisfaction, and also in Shohadaye Tajrish Hospital employees) (Table 5).

Table 5. Chi-square test results of the association between "musculoskeletal (MSK) pain in the last week" and other variables

Variable	Pearson's chi-square value	P
Hospital of employment	316.20	< 0.001
Gender	14.80	0.005
Routine weekly physical activity	14.30	0.006
Degree of education	18.60	0.005
Job satisfaction	14.40	0.006

However, there was no relation detected between these symptoms and the ward of employment as well as the mean weekly working hours (Table 6).

Table 6. Chi-square test results of the association between "musculoskeletal (MSK) pain in the last year" and other variables

Variable	Pearson's chi-square value	P
Hospital of employment	111.30	< 0.001
Gender	20.30	< 0.001
Routine weekly physical activity	22.30	< 0.001
Degree of education	31.20	< 0.001
Job satisfaction	17.30	0.002

Performing the independent t-test disclosed an association between daily functional impairment due to MSK pain during the last year and the years of employment (t = 2.07, P = 0.03). On the other hand, it suggested the MSK pain during the last year to be independent of variables such as BMI, age, the mean daily working hours (standing or sitting), the mean hours of mobile phone usage, the mean weekly working hours, and the years of employment (Table 7).

Table 7. Chi-square test results of the association between "daily function impairment due to musculoskeletal (MSK) pain in the last year" and other variables

Variable	Pearson's chi-square value	P
Hospital of employment	318.06	< 0.001
Gender	12.50	0.014
Routine weekly physical activity	11.60	0.021
Degree of education	16.60	0.011
Job satisfaction	13.80	0.008

Furthermore, the MSK pain in the last week or last year and the daily function impairment during the last year were not proved to be associated (P-values of 0.6, 0.8, and 0.6, respectively) with the ward of employment.

Discussion

The present study aimed to evaluate the prevalence of MSK pain and its association with some demographic and work-related factors in the medical staff, in three medical centers of Shahid Beheshti University of Medical Sciences. Considering the significance and prevalence of MSD in employees and specifically medical personnel, it has been subjected to many studies worldwide.

In the majority of the studies, the 3 most frequently reported painful regions were the back, neck, and shoulder.[10,20,21] Davis and Kotowski mentioned that the majority of the studies were focused on the prevalence of low back pain in medical personnel (and to a less degree, pain in the upper and lower extremity) in a systematic review.[16] This study also showed a similar pattern (low back, neck, knee, and shoulder in descending order of frequency).

In a study by Yang et al. in China, female gender, unmarried status, risk factor understanding, and lack of safe workplace were reported to be associated with MSDs, and therefore, providing a safe environment and improving the physical and psychological aspects of the workplace were emphasized.[10] In the systematic review by Yassi and Lockhart in 2013, low back pain in

nurses was reported to be associated with their occupational tasks and activities.[22] The present study suggested the MSK pain during the last year not being associated with BMI, age, the mean daily working hours (standing or sitting), the mean hours of mobile phone use, the mean weekly working hours, and the years of employment.

This subject is also widely studied in Iran; as it was explored by Dadarkhah et al. in Artesh Hospital in Tehran, and the most frequent pain complaints were reported in the back, neck, and shoulder (in descending order). Moreover, an association between lower limb pain and BMI, low back pain, and married status was reported. Also, "years of employment" were related to painful shoulder, back, elbow, wrist, hip, and knee.[22] Mirmohammadi and Yazdani-Charati performed a survey on 110 nurses and suggested an association between occupational MSDs and BMI.[23]

Sharif nia et al., on the other hand, studied 400 nurses in 2011 and reported a prevalence of 81.0% for low back pain; they also found a notable gender dominance (female to male) in the prevalence of neck pain and low back pain.[18] This study revealed an association between MSK pain during the last week and the last year and also daily functional impairment due to MSK pain in the medical staff and the variables such as female gender, lack of routine weekly physical activity, educational degree of BS, lack of job satisfaction, and the hospital of employment (Shohadaye Tajrish).

On the other hand, 63.3% of the participants mentioned workshops as the preferred method for ergonomic education although 71.9% considered their workplace not to be ergonomics-friendly, which is a barrier for application of the protective and preventive ergonomic knowledge, although the theory is obtained.

Conclusion

MSDs are among the most common work-related disorders worldwide; and despite the limitations of this study, it is safe to conclude that MSK pain is quite prevalent in medical staff in Shahid Beheshti University Hospitals. The most common regions of pain complaints were reported to be the lower back and neck, as it was shown in many other studies. In evaluating the associations between different personal and work-related factors and the MSK complaints, this study revealed MSK pain during the last week and the last year and also daily functional impairment due to MSK pain in the medical staff to be associated with female gender, lack of routine weekly physical activity, education degree of BS, lack of job satisfaction, and the hospital of employment (Shohadaye Tajrish).

Limitation and strength: The self-reported questionnaire can influence the reliability of the data; on the other hand, the relatively big sample size and distribution in different hospitals can be partially compensating for this issue.

Conflict of Interest

Authors have no conflict of interest.

References

1. Abledu JK, Offei EB, Abledu GK. Predictors of work-related musculoskeletal disorders among commercial minibus drivers in Accra Metropolis, Ghana. Advances in Epidemiology 2014; 2014: 384279.
2. Ando S, Ono Y, Shimaoka M, Hiruta S, Hattori Y, Hori F, et al. Associations of self estimated workloads with musculoskeletal symptoms among hospital nurses. Occup Environ Med 2000; 57(3): 211-6.
3. Lorusso A, Bruno S, L'Abbate N. A review of low back pain and musculoskeletal disorders among Italian nursing personnel. Ind Health 2007; 45(5): 637-44.
4. Soylar P, Ozer A. Evaluation of the prevalence of musculoskeletal disorders in nurses: A systematic review. Med Science 2018; 7(3): 479-85.
5. Burdorf A, Sorock G. Positive and negative evidence of risk factors for back disorders. Scand J Work Environ Health 1997; 23(4): 243-56.
6. Ellapen TJ, Narsigan S. Work related musculoskeletal disorders among nurses: Systematic review. J Ergon 2014; S4: S4-003.
7. Trinkoff AM, Brady B, Nielsen K. Workplace prevention and musculoskeletal injuries in nurses. J Nurs Adm 2003; 33(3): 153-8.
8. Trinkoff AM, Lipscomb JA, Geiger-Brown J, Storr CL, Brady BA. Perceived physical demands and reported musculoskeletal problems in registered nurses. Am J Prev Med 2003; 24(3): 270-5.
9. SHokati B, Yekta Kooshali M, Zareiyan A, Akbari Negad SH, Soroush A. The prevalence of work-related musculoskeletal disorders among X-ray radiographers those working in radiology centers of the hospitals affiliated in AJA University of Medical Sciences: A cross-sectional study. Journal of Military Caring Sciences 2018; 4(3): 198-206. [In Persian].
10. Yang LQ, Spector PE, Chang CH, Gallant-Roman M, Powell J. Psychosocial precursors and physical consequences of workplace violence towards nurses: A longitudinal examination with naturally occurring groups in hospital settings. Int J Nurs Stud 2012; 49(9): 1091-102.
11. Nyman T, Grooten WJ, Wiktorin C, Liwing J, Norrman L. Sickness absence and concurrent low back and neck-shoulder pain: Results from the MUSIC-Norrtalje study. Eur Spine J 2007; 16(5): 631-8.
12. Pompeii LA, Lipscomb HJ, Dement JM. Predictors of lost time from work among nursing personnel who sought treatment for back pain. Work 2010; 37(3): 285-95.
13. Engels JA, van der Gulden JW, Senden TF, van't Hof B. Work related risk factors for musculoskeletal complaints in the nursing profession: Results of a questionnaire survey. Occup Environ Med 1996; 53(9): 636-41.
14. Raeisi S, Namvar M, Golabadi M, Attarchi M. Combined effects of physical demands and shift working on low back disorders among nursing personnel. Int J Occup Saf Ergon 2014; 20(1): 159-66.
15. Engels JA, Landeweerd JA, Kant Y. An OWAS-based analysis of nurses' working postures. Ergonomics 1994; 37(5): 909-19.
16. Davis KG, Kotowski SE. Prevalence of musculoskeletal disorders for nurses in hospitals, long-term care facilities, and home health care: A comprehensive review. Hum Factors 2015; 57(5): 754-92.
17. Attar SM. Frequency and risk factors of musculoskeletal pain in nurses at a tertiary centre in Jeddah, Saudi Arabia: A cross sectional study. BMC Res Notes 2014; 7: 61.
18. Sharif nia SH, Haghdoost AA, Hajihosseini F, Hojjati H. Relationship between the musculoskeletal disorders with the ergonomic factors in nurses. Koomesh 2011; 12(4): 372-8. [In Persian].
19. Freimann T, Coggon D, Merisalu E, Animagi L, Paasuke M. Risk factors for musculoskeletal pain amongst nurses in Estonia: A cross-sectional study. BMC Musculoskelet Disord 2013; 14: 334.
20. Gaowgzeh RAM. Low back pain among nursing professionals in Jeddah, Saudi Arabia: Prevalence and risk factors. J Back Musculoskelet Rehabil 2019; 32(4): 555-60.
21. Moreira RF, Sato TO, Foltran FA, Silva LC, Coury HJ. Prevalence of musculoskeletal symptoms in hospital nurse technicians and licensed practical nurses: Associations with demographic factors. Braz J Phys Ther 2014; 18(4): 323-33.
22. Yassi A, Lockhart K. Work-relatedness of low back pain in nursing personnel: a systematic review. Int J Occup Environ Health. 2013;19(3):223-44.
23. Mirmohammadi S, Yazdani-Charati J. Prevalence of work-related musculoskeletal disorders and associated risk factors among nurses in a public hospital. Iran J Health Sci 2014; 2(3): 55-61.