Research Article

Musculoskeletal Disorders and Their Related Risk Factors Among Iranian Nurses

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Abstract

Background: Work-related musculoskeletal disorders (MSDs) are one of the most occupational problems among nurses and often cause many physical and psychological complications for nurses, and are a financial burden for health-care systems.
Objectives: The aim of this study was to determine the prevalence MSDs and their related risk factors among Iranian nurses.
Patients and Methods: This descriptive-correlational study included 240 hospital nurses, with a baccalaureate nursing degree, who worked at three public hospitals of the Ilam province of Iran. Data were collected through a validated self-administered questionnaire. Finally, 156 questionnaires were returned (response rate: 65%) and 135 questionnaires qualified for subsequent analysis. The data were analyzed using the SPSS version 15.0 software. Descriptive and inferential statistics (logistic regression) were used.
Results: Overall, 97 (71.9%) hospital nurses experienced MSDs in at least one anatomical site within the last year. Low back pain was the most prevalent MSDs (40%) and hip and thigh were the least (11.1%) frequent sites. Most of the nurses with MSDs worked at surgery wards (17.8%), emergency (15.6%) and intensive care units (12.6%). Pain (48.1%) and cramps (31.9%) were the most frequent symptoms of MSDs and loss of limbs control (5.9%) was the least frequent symptom. Bend or twist at waist for performing nursing procedures, patient transfer from and to beds, working with the hands higher than shoulder height and changing position of patients in beds were the most frequent occupational factors that influenced MSDs. Increased age, weight, height, body mass index (BMI) and gender had no significant association with MSDs. However, being single and involved in any kinds of physical activity were significantly associated with the prevalence of MSDs (P < 0.05).
Conclusions: The study findings indicated high prevalence of worked-related MSDs among Iranian hospital nurses. Accordingly, appropriate policies for managing MSDs among hospital nurses should be considered.

Keywords: Musculoskeletal Disorders, Nurses, Workplace, Iran

1. Background

Work-related musculoskeletal disorders (MSDs) have been described as symptoms caused by occupational hazards including pain and discomfort in body structures, such as muscles, bones, nerves, tendons, ligaments and vascular system (1). Work-related MSDs adversely affect workers' quality of life, productive capacity, absenteeism pattern, and disabilities (2). According to global statistics it has been estimated that two million people die annually due to work-related injuries or illnesses, while there are 160 million new cases of work-related illnesses each year (3). The costs of occupational MSDs is important not only for employees, but also the employers and societies (4). It has been estimated that approximately 2% of Europe's gross domestic income is lost with the direct cost of MSDs without considering productivity losses and social costs (1). It has also been estimated that in GB an annual 9.26 million working days were lost in 2008.9 due to sickness absence (5).

Health care workers, particularly those who are involved in patient-handling are affected by MSDs and their related disabilities more than other workers (6). Due to the nature of tasks, nursing is ranked among the occupations with the highest prevalence of work-related disorders and disabilities. It has been reported that the annual incidence of MSDs among both eastern and western nursing populations ranges from 40% to 85% (4). The incidence rate of MSDs among U.S. nursing population was 239 per 10000 full-time workers in 2011, which was the highest among all surveyed occupations (7). In previous studies reported that prevalence of MSDs among Turkish hospital nurses was higher (77.1%) than other health care workers. In China the prevalence of MSDs in hospital nurses was found to be as high as 70%, whereas in a study from Japan, only 37% of nursing aides reported some types of MSDs. In our country, Iran, the findings of several studies showed that the preva-

lence of MSDs in hospital nurses varied between 46 and 88% (6, 8-11).

According to the literature, the most common MSDs among nurses are lower back pain, with a one-year prevalence rate of 30% - 62% (4, 12-14). Neck (prevalence rates of 36% - 54%) and shoulders (prevalence rates of 36% - 53%) have also been cited as common sites of MSDs in nurses (4, 6, 8, 15). Musculoskeletal disorders are also one of the main causes of sick leaves among hospital nurses. It has been estimated that nurses have almost 30% more sickness absence compared to other occupations (1, 6). Further, several studies have shown that the physical or psychological demands of work and their related MSDs might cause hospital nurses to leave their profession, which can exacerbate the current worldwide shortage of nurses (12, 14). The findings of a study from the United States showed that 25% of registered nurses (RN) had changed their jobs or planned on leaving their current position due to work-related MSDs (12).

Factors associated with MSDs include individual characteristics, such as age, gender, muscular strength and body mass index (BMI), occupational risk factors and non-work related exposures (1). Most occupational incidents among nurses often result from physical tasks including poor handling and lifting maneuver such as changing position of patients, transferring patients from and to beds, awkward body postures, prolonged standing and tedious and monotonous activities. Psychosocial factors such as lack of time, low job control, and job satisfaction, lack of support and insecurity at work, have also been recognized as risk factors for MSDs among nurses (16, 17).

There are large amounts of studies documenting the prevalence of MSDs among nurses in developed countries. However, to date, there is limited knowledge with regards to the nursing populations in Iran and most studies on this topic were conducted in Tehran, the capital of Iran.

2. Objectives

The aim of the present study was to explore the one-year prevalence and risk factors of work-related MSDs in hospital nurses working in public hospitals of the Ilam province in south-western Iran.

3. Patients and Methods

This descriptive-correlational study was conducted in three educational hospitals of Ilam, in south-western Iran. Inclusion criteria were: willingness to participate in the study, age of 20 - 59 years, having graduated from a four-year bachelor program, and having worked as a clinical nurse for at least one year in Iran. Nurses with a history of MSDs caused by non-work related diseases or trauma, 18 > BMI > 25, and those who were pregnant during the data collection were excluded from the study.

Nurses who met the criteria of the study were identified and all eligible subjects were informed and invited to participate. They were selected using the convenience-sampling method. The study population included all nurses (n = 240), who were full-time workers in those centers during the study period; of those, 21 were ineligible to participate, resulting in a final sample size of 219. Overall, 156 interested participants accepted to be enrolled and signed the informed consent. Before the data collection, the study proposal was approved by the regional ethics committee of Ilam University of Medical Sciences. All patients who participated in the study gave their informed consent. Data collection lasted from June to September 2013.

The instrument for data collection was adapted from the Nordic questionnaire of musculoskeletal symptoms and the job content questionnaire (JCQ) used by Trinkoff et al. (2003) (12). This instrument composed of three main parts. The first part was to collect demographic characteristics such as age, gender, BMI, work schedule during the past year, weekly work hours, work experience, smoking habits and regular exercise. The second part included questions about the experience and symptoms of work-related MSDs at any sites of the body during the previous week in past 12 months (lasting for longer than a day), and the number of working days lost due to MSD-related sick leaves. This questionnaire was designed according to some related literature (6, 8, 10, 18). The third part was related to physical demands of work. In this section patients were asked regarding bend or twist at waist for performing nursing procedures, patient transfer activity, working with the hands higher than shoulder height, standing in one place or static position, and changing position of patients in their bed. These items were classified according to a four-point Likert scale ranging from one (never) to four (always). Nurses were also asked to rate their satisfaction regarding their career or work setting, amounts of support by their co-workers or managers, and perceived exhaustion due to overwork. The scales face and content validity were assessed and verified by the medical and ergonomic expert panel, which constituted of ten faculty members affiliated to the Ilam and Tehran Universities of Medical Sciences, Iran. Some changes were applied according to expert recommendations. The final version of the questionnaire was tested for reliability in a pilot study involving 30 nurses (Cronbach's alpha = 0.83).

Data were analyzed using the SPSS software version 13. Descriptive statistics such as the frequencies, percentages,

mean and standard deviation were used to describe the demographic and work-related data. Chi-square and logistic regression were used to determine the associations between some of the study variables and reported MSDs. Musculoskeletal disorders were assumed as the dependent variable. Demographic characteristics and some of the workplace factors were defined as independent variables. $P < 0.05$ were considered significant.

4. Results

A total of 141 questionnaires were returned (response rate: 90%), of those six questionnaires were excluded due to improper or incomplete filling, leaving 135 respondents in the survey. The mean $\pm$ SD of contributors' age, height (cm) and body weight (kg) were 35.76 (8.34), 169 (8) and 69.67 (11.22), respectively. Table 1 shows the socio-demographic characteristics of the nurses. Overall, 71.9% of the participants reported at least one occurrence of MSDs in the past year. Lower back pain was the most prevalent MSDs (40%) and hip and thigh were the least (11.1%) frequent sites during the last year. Table 2 depicts the frequency of reported MSDs at different sites of the body. The most common symptoms associated with MSDs were pain (48.1%) and cramp (31.9%). Partial loss of limbs control (5.9%) was the least frequent symptom (table 3). According to the participants self-report, 22.2% of them lost one to seven working days during the past year due to MSD-related sick leaves. The mean of sickness leaves was 1.63 (SD 3.79) day/year per nurse. Almost one-third of sick leaves were due to back pain. The highest prevalence of MSDs was for the age group of 30 - 40 years (32.6%). In addition, the highest prevalence of MSDs was seen among nurses with less than five years of work experience. The prevalence of MSDs was the highest in the surgical ward (17.8%), emergency (15.6%) and intensive care unit (12.6%). Bend or twist at waist for performing nursing procedures (10.2%), patient transfer from and to beds (9.1%), working with the hands higher than shoulder height (7.8%) and changing position of patients in beds (6.8%) were the most influential occupation-related factors on MSDs. Some physical demands of work such as bend/twist at waist for performing nursing procedures ($P = 0.027$), working with the hands higher than shoulder height ($P = 0.007$) and pulling or pushing heavy objects ($P = 0.042$) were significantly associated with the prevalence of MSDs. Some psychological demands of work such as lack of peer support, satisfaction with work, and lack of time were not significantly associated with prevalence of MSDs symptoms. However, high workload was significantly associated with the prevalence of low back pain ($P = 0.027$). Some individual factors such as age, weight, height, body mass index (BMI), and gender

had no significant association with MSDs. However, marital status and doing physical activity were significantly associated with the prevalence of MSDs ($P < 0.05$). Nurses who were single and were involved in some kind of physical activity had a lower percentage of MSDs.

Table 1. Socio-Demographic Characteristics of the Nurses

Variable	No. (%)
Gender	
Male	56 (41.5)
Female	79 (58.5)
Marital status	
Single	92 (68.1)
Married	43 (31.9)
Education	
Associate diploma	42 (31.1)
B.Sc.	80 (59.3)
M.Sc.	13 (9.6)
BMI	
Underweight	4 (3.0)
Normal	83 (61.5)
Overweight	45 (33.3)
Obese	3 (2.2)
Physical activity schedule	
Regular	27 (20)
Irregular	108 (80)
Smoking	
Yes	10 (7.4)
No	125 (92.6)
Working schedule	
Shifts	99 (73.3)
Fixed	36 (26.6)

5. Discussion

The aim of this study was to explore the prevalence and risk factors of work-related MSDs among hospital nurses in Iran. The study findings showed that almost three out of four of the study subjects experienced at least one occurrence of MSD of anybody region during the past year. Some other national and international studies have reported similar findings ([4], [8], [12], [19]). Therefore, the findings of this study highlighted the importance of existing evidence. In our study, lower back, neck, upper back and knees symptoms were the most common sites of MSDs. Congruent to

Table 2. Frequency of Reported Musculoskeletal Disorders at Different Sites of the Body Region

Body Region	Frequency, %
Neck	31.1
Shoulder or elbow	14.1
Wrist	11.9
Upper back	23
Lower back	40
Hip	11.1
Thigh	11.1
Knee	20
Feet	17

Table 3. Frequency of Reported Symptoms Associated With Musculoskeletal Disorders

Symptoms	Frequency, %
Pain	48.1
Burning	11.9
Cramps	31.9
Loss of control	5.9
Movement disorder	7.4
Swelling	11.1
Weakness	12.6
Sensory loss	6.7
Other	1.5

our findings, Choobineh et al. (2006) reported that lower back, ankles or feet, and knee were the most common MSDs among operating room nurses of Shiraz city hospitals in Iran (8). Also, in our study, low back pain was the most prevalent MSD reported by 40% of the participants. In another Iranian study, Barzideh et al. (2014) reported that the past 12-month incidence of lower back symptoms was 61.8% (20). Yip (2001) revealed that 21.6% of sick leaves taken by nurses in Hong Kong were due to low back pain (21). In our study, females had higher prevalence of MSDs than males, yet this difference was not statistically significant. This is incongruent with some related studies, which found significantly higher occurrences of MSDs among female than male nurses (8, 19). The study findings showed that the prevalence of MSDs among 30 to 40-year-old nurses was higher than other age groups. In addition, the highest prevalence of MSDs was seen among nurses with less than five years of work experience. However, there were no significant associations between age or work experience and

prevalence of MSDs. Contrary to our findings, Attarchi et al. (2014) (13) reported that work experience of more than seven years was associated with low back symptoms.

The study findings also revealed that MSDs were one of the main causes of sick leave among study subjects. Almost one out of five nurses lost one to seven working days during the past year due to MSDs. However, the mean sickness absence in our study was slightly lower than other studies in Iran. Choobineh et al. (2006) (8) reported that nearly 1% of study subjects were not productive during the past year due to sick leaves.

As most of our participants' weight was in the normal range, BMI was not associated with MSDs. This is in agreement with the findings of Attarchi et al. (2014) (13) from Tehran, Iran. However, Trinkoff et al. (12) reported a significant association between BMI and back/ shoulder symptoms. The findings of a systematic review by Leboeuf-Yde (2000) also showed a positive association between body weight and LBP only in 32% of studies (22). The study findings also revealed that being single and having any kind of physical activity were significantly associated with the prevalence of MSDs. Narayan et al. (2014) also reported that doctors, who are involved in some kinds of physical activity had a lower percentage of MSDs compared to those, who were not performing any physical activity (23). In contrary to the findings of some related studies (24, 25), in the current study there was no significant association between smoking and prevalence of LBP. However, the findings of a systematic review by Leboeuf-Yde (2000) (22) also showed that tobacco use is not a strong predictor of LBP. According to our findings, the prevalence of MSDs was the highest in the surgical ward, emergency and intensive care unit. Reed et al. (2014) reported that working at the ICU caused four-fold increase in foot/ankle MSDs (26).

The study findings showed that some physical demands of work such as bend/twist at waist for performing nursing procedures, working with the hands higher than shoulder height and pulling or pushing heavy objects were significantly associated with the prevalence of MSDs. This is in agreement with the findings of other researchers (8, 13, 19). According to Choobineh et al. (2006) the most common physical demands of work that were significantly associated with MSDs included moving/lifting heavy loads, awkward posture, static posture, applying pressure with hands/fingers and intensive physical efforts (8).

Among the psychological demands of work, high workload was significantly associated with prevalence of low back pain. The findings of a review study also revealed that perceived workload, time pressure and poor social support were the main psychological factors associated with MSDs prevalence (27). However, the findings of a systematic review by Campbell et al. (2013) showed that there

was no effect of co-worker, supervisor or general work support on risk of new onset back pain (28). There are limited knowledge regarding the association of work-related psychosocial factors and MSD in hospital nurses and most of the previous studies focused on physical demands like manual handling.

In conclusion, the findings of this study reconfirmed the high prevalence of work-related MSDs among hospital nurses and also highlighted the importance of physical or psychological demands of work in relation to such symptoms. The most critical cause for such MSDs could be lack of training to be aware of the associated work-related situations. Intervention studies have shown good results in preventing MSDs in nurses by reducing physical demands (12). However, interventions to reduce MSDs in hospitals should take into account not only ergonomics, but also the improvement of organizational aspects of the work environment (1).

Nevertheless, future studies should use stronger study designs (e.g. longitudinal designs) to undertake more accurate assessments of other work-related physical or psychosocial exposures that may be related to MSD.

Acknowledgments

Footnote

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