

## The effect of work- related stress on development of neck and shoulder complaints among nurses in one tertiary hospital in Iran

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### Abstract

**Background:** There are some challenges about the role of work- related stress on development of musculo-skeletal complaints. The present prospective study was conducted on nurses of Milad hospital in Tehran (Iran) to assess the role of work- related stress on development of neck and shoulder pain among nurses.

**Methods:** From the 1,900 nurses who completed the registry forms, 1,450 nurses met the inclusion criteria. We divided the participants into exposed and unexposed groups according to their DASS-21 scores. We collected the data of neck and shoulder pain among the nurses at two points of the first and the second year after the study, using the Nordic Questionnaire. Qualitative and quantitative variables were compared between the exposed and unexposed variables with chi-square and independent sample t-test, respectively.

**Results:** One year after the commencement of the study, 62 (9.1%) nurses in the exposed group and 36 (4.7%) in the unexposed group had been reported as new cases of neck and shoulder pain, respectively. The incidence of the new cases of neck and shoulder pain was significantly higher in the exposed group compared to the unexposed group ( $p=0.001$ ). Two years after the start of the study, at the second follow-up point, 135 (19.8%) nurses in the exposed group and 76 (9.9%) in the unexposed group had been reported as new cases of neck and shoulder pain, respectively. The incidence of new cases of neck and shoulder pain was significantly higher in the exposed group compared to the unexposed group ( $p<0.001$ ).

**Conclusions:** The incidence of neck and shoulder pain was higher in those nurses with high level of work-related stress. According to our results, more attention should be paid to mental health as well as physical symptoms and limitations of the healthcare workers when they refer to occupational health services with musculo-skeletal pain complaints.

**Keywords:** Neck, Nurse, Pain, Shoulder, Stress.

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### Introduction

Musculoskeletal disorders (MSD), especially in some body regions such as neck, shoulder, and upper limbs, may cause adverse economic burden and long-term sickness absence (1). For instance, between \$50 and \$100 billion dollars were reported as MSD cost, and near 22.4 million American workers suffered from MSD (2). In developing countries such as Iran, we had similar

and often more severe situations for MSDs, especially for neck and back pain (3). Thus, it is highly important to examine the MSD causative factors among the Iranian work- ing population.

Different physical and psychological factors might play a role in developing MSD. Although intervertebral disc herniation and carpal tunnel syndrome had been suggested in the similar studies as the cause of pain or

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discomfort, most of underlying causes of pain have not been clearly defined and are known as nonspecific symptoms (2,4-6). Some other investigators believed that MSDs are complex and are not a simple consequence of harmful physical activities (7). They believed that psychological factors such as low mood, job satisfaction, and job stress have causative associations with work-related musculoskeletal disorders (8-10). They used different methods of ergonomic training to decrease the prevalence of musculoskeletal disorders among the working populations (1,4). Others advocated that work-related stress can improve the awareness of workers about their health status to report their pain, and decrease their pain sensation threshold (5).

A recent systematic review (6) reported that work-related stress had a significant impact on the development of musculoskeletal symptoms. In addition, in most previous studies, only the association of work-related stress with development of musculoskeletal was studied with a cross-sectional design. However, causative linkage cannot be described with a cross-sectional design. On the other hand, if we could clearly define a causative association between work-related stress and development of musculoskeletal disorders, we could encourage workers and their employers to pay more attention to mental health state of those workers with musculoskeletal discomforts. The present prospective study was performed on healthcare workers in one Iranian hospital to assess the role of work-related stress on development of neck and shoulder complaints among the nurses.

## Methods

### *Setting and Samples*

The present prospective study was performed on nurses of Milad hospital in Tehran (Iran) using the data of mental health registry system (MHRS). MHRS of the healthcare workers has been created by occupational medicine research center of Iran University of Medical Sciences to assess

and monitor work related data including demographics (age, sex, BMI, educational level. Smoking, regular exercise, sleep disturbance), Occupational (work history, shift working, number of night shift) and mental (mental health status, work satisfaction, work related stress, burnout) data of the nurses since 2014. Those full-time nurses who were at least 18 years old and had one-year of work experience in the current situation were eligible to participate in this study. Data of the nurses from all hospital wards including internal medicine, surgery, pediatric, intensive care units, urgency, and the minor wards in MHRS were eligible to be entered into the study analysis. In total, 1,900 data were gathered and entered into the registry system. Finally, 1,450 nurses were eligible to be included into the statistical analysis.

We divided the participants into exposed and unexposed groups according to their DASS-21 scores. The Depression, Anxiety, and Stress Scale (DASS) is a set of 3 self-report scales designed to measure the negative emotional states of depression, anxiety, and stress (10). In addition to the basic 42-item questionnaire, a short version, the DASS21, is available with 7 items per scale (10). As the essential development of the DASS was conducted on non-clinical samples, it is also suitable for screening normal adolescents and adults. In each item, the respondents are to rate the extent to which they have experienced the given state over the past week using a 4-point severity/frequency scale. Scores for depression, anxiety, and stress are calculated by summing up the scores for the relevant items (11). In the present study, the short (21-item) version of DASS was used. The validity and reliability of the DASS questionnaire in measuring the dimensions of depression, anxiety, and stress has been proved in different studies and several are listed at the official website (9).

### *Measurements/Instruments*

We collected data about neck and shoulder pain among the nurses at two points:

First and second year after the commencement of the study from MHRS using a completed self-reported NMQ.

An occupational medicine specialist assessed the work-related neck and shoulder pain in the nurses every year and reported them in regular MHRS reports. During MHRS follow-up time, the occupational specialist asked the nurses to report any neck or shoulder complaint immediately. Then the study investigators examined them. In the noted 4 follow-up points, the MHRS experts contacted the participants via a phone call and asked them why they had not completed their Nordic questionnaire. Finally, the data of 1,450 nurses were included for analysis, and the participants were divided into the exposed (n=682) and unexposed (n=768) groups.

#### Statistical Analysis

Study data were entered into the SPSS 22 (SPSS Inc. Chicago Ill) and analyzed with statistical tests. Data were presented as mean  $\pm$  standard deviation for continues variables and frequency (percentage) for qualitative variables. Qualitative and quantitative variables were compared between the exposed and unexposed variables using chi-square and independent sample t-test, respectively. We set 95% as the level of confidence, and p-value less than 0.05 was considered significant. We cross-tabulated the findings of each follow-up point and reported the number of positive cases in both groups and risk of getting MSD disorders in the exposed and unexposed group. Finally, the risk ratio was calculated.

#### Ethical Consideration

The ethical research committee of Iran University of Medical Sciences approved this registry protocol.

#### Results

##### Demographic Items in the Participants

In total, 1,450 nurses were included in the study, and female nurses constituted more than 72.6% of the participants. Mean $\pm$ SD of age and work experience among the participants was 36.16 $\pm$ 5.16 and 6.89 $\pm$ 2.56 years, respectively. Mean $\pm$ SD of BMI in our participants was 24.86 $\pm$ 3.02kg/m<sup>2</sup>. The nurses were divided into the exposed (n=682) and unexposed (n=768) groups. Among the study sample, 791 (54.6%) nurses were shift workers, and the frequency of shift working was not significantly different between the exposed and unexposed nurses (n=365, 53.5% vs. n=426, 55.5%; p=0.461).

The frequency of sleep disturbance among the nurses of the exposed group was none significantly higher than the unexposed group (n=200, 29.3% vs. n=193, 25.1%; p=0.073). The mean of age in the exposed nurses was not significantly higher than the unexposed participants (36.26 $\pm$ 5.11 vs. 36.07 $\pm$ 5.19; p=0.462). Moreover, no significant difference was observed in BMI between the exposed and unexposed (24.74 $\pm$ 2.93 vs. 24.97 $\pm$ 3.09; p=0.153) nurses.

Most of the participants in the exposed (n=492, 72.1%) and unexposed group (n=560, 72.9%) were female. Smoking was more common in the unexposed group (n=730, 95.1%) compared with the exposed

Table 1. Distribution of Demographic Variables between the 2 Groups

Study Variables	Exposed N (%)	Unexposed N (%)	p
Sex (Female)	492 (72.1%)	560 (72.9%)	0.742
Shift working	365 (53.5%)	426 (55.5%)	0.461
Smoking	37 (5.4%)	38 (4.9%)	0.685
Regular exercise	181 (26.5%)	193 (25.1%)	0.542
Age	36.27 $\pm$ 5.12	36.07 $\pm$ 5.19	0.462
Work experience	7.76 $\pm$ 3.34	7.85 $\pm$ 3.57	0.633
BMI	24.74 $\pm$ 2.93	24.96 $\pm$ 3.09	0.153

\*BMI: Body Mass Index

group (n=645, 94.6%) (p=0.682). Details of the demographic variables between the exposed and unexposed groups are presented in Table 1.

#### *Prevalence of Neck and Shoulder Complaints among the Nurses in the Exposed and Unexposed Groups within the Follow-Up Points*

In the present study, we followed the participants at two follow-up points. At the start of the study, we did not have any case of neck and shoulder complaints among the exposed and unexposed groups. However, one year after the commencement of the study, we reported all the new cases within the first year of the study. Finally, 2 years after the study, we reported all the new cases within the second year of the study.

##### *First Follow-Up Time*

One year after the study, at the first follow-up point, 62 (9.1%) nurses in the exposed and 36 (4.7%) in the unexposed group had been reported as new cases of neck and shoulder complaints, respectively. The incidence of neck and shoulder complaints was significantly higher in the exposed group compared to the unexposed group (p=0.001).

##### *Second Follow-Up Time*

Two years after the study, at the second follow-up point, 135 (19.8%) nurses in the exposed group and 76 (9.9%) in the unexposed group had been reported as new cases of neck and shoulder complaints, respectively. The incidence of neck and shoulder complaints pain was significantly higher in the exposed group compared to the unexposed group (p<0.001). Details of neck and shoulder complaints in the 2 groups are displayed in Table 2.

## **Discussion**

Findings of our study revealed that the incidence of neck/shoulder pain among the nurses with work-related stress was higher than in the nurses without work-related stress. On the other hand, work-related stress had been known as a risk factor for neck and shoulder pain among the nurses. Neck and shoulder pain is a common musculoskeletal disorder among the employees, and its annual prevalence was reported to be 27.1 to 47.8% (8,12). In most workers, acute neck pain resolved within the days or weeks and recurred in 50-60% of the cases within the one-year follow-up (1,4,12). It is estimated that 10% of the cases with acute neck pain become a chronic condition (13). According to the above rate, determining the risk factors for neck/shoulder pain is important and plays a main role in prevention strategies of chronic pain among the nurses. There is consensus among the investigators that repetitive work or precision work was reported as mechanical risk factors of neck or shoulder pain among the workers (8,14). There were no valuable documents with suitable design and study power on other mechanical risk factors such as working with hands above the shoulders, awkward postures, heavy lifting, and manual handling (8,14).

According to a previously done systematic review, high job demands and low social/work support are known as psychological risk factors for musculoskeletal disorders among workers (8,14-17). Limited valid evidences are available for other psychological factors such as work-related stress (17). Most recent studies that have assessed the role of mechanical and psychological risk factors such as work-related stress on the prevalence of MSD complains, including neck/shoulder, pain are not completely

Table 2. Incidence of Neck and Shoulder Pain among the Exposed and Unexposed Participants at 3 Study Follow-Up Points

Follow-up Points	Neck and Shoulder Pain		p	RR (95% CI)
	Exposed N (%)	Unexposed N (%)		
First year	62 (9.1%)	36 (4.7%)	0.001	1.94 (1.30-2.89)
Second years	135 (19.8%)	76 (9.9%)	<0.001	2.01 (1.54-2.59)

reliable due to their small sample size or cross-sectional design (14-16,18). It seems that there is a lack of large longitudinal studies with enough sample size to distinguish between mechanical and psychological MSD risk factors. Moreover, conclusions based on one occupation may not be valid for the general working population and can only be extended on the same working position and tasks. Our study sample size was large enough to reach a conclusion. Thus, we can conclude that work-related stress can cause neck/shoulder pain among workers, especially in nurses. Similar to the findings of our study, some previous studies assessed work-related stress using a questionnaire and found that risk of developing pain was higher in those previously exposed to stress (19-21). Nevertheless, they did not report the inverse relationship of the risk of developing occupational stress in relation to earlier pain. Only one study reported that neck problems were associated with an increased risk of future psychological distress (22). Contrary to our results, a recent review on several longitudinal studies reported that perceived stress predicted the subsequent development of somatic symptoms, but risk estimates were modest (5,23).

### Conclusion

Our results suggest that the incidence of neck and shoulder pain was higher in nurses with high level of work-related stress. According to our results, we should pay sufficient attention to mental health as well as physical symptoms and limitations when workers present to occupational health services with musculoskeletal pain.

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