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Original

Modeling of Occupational Risk Factors in the Development of Musculoskeletal Disorders in Nurses

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Abstract

Background: Musculoskeletal disorders are one of the most common occupational diseases in hospital staff. Factors that are effective on the incidence of musculoskeletal disorders can point to stress and job satisfaction and unsuitable postures. By regarding the key role of nursing staff in hospitals in giving health services, this study has been done with the aim of the survey about the relationship between stress amount and job satisfaction with musculoskeletal disorders in nurses. **Methods:** This analytical description study had been done in the year 2017, accidentally between 140 persons, 90 of available nurses that during sampling were in the nursing station of one of Tehran hospitals. For data collection one used standard questionnaire composed of demographic information and job information about musculoskeletal disorders, satisfaction, and job stress. Also for finding the relationship between variables one used correlation test, multivariate linear regression and independent t-test by SPSS20 Software. **Results:** Results shows that one of the biggest postures adopted by nurses is waist bending that the result of that is a pain in the lower part of the waist. By doing multivariate linear regression in SPSS20, a model for prediction pain in the lower part results from waist bending gained. Between job stress and job postures, there have been seen a significant relationship (P<0/05) in this test there was no significant relationship between job satisfaction and job postures. **Conclusion:** Extra physical activities lead to unsuitable and repetitive postures in nurses that are one of the most important factors in creating job stress in nurses. For decreasing coming stress to staff, they should give information and needed knowledge about correct posture adoption to everyone.

Key words: Musculoskeletal disorders; Job stress; Job satisfaction; Nurses

Introduction

Nurses have an important role in each health institution and they are the biggest workforce in each therapeutic institution. These people for caring patients, go to the hospital, 24 hours day and night and seven days a week.[1] By regarding that nurses spend an important part of their life in the work environment and based on different situations they exposed more towards job problems and this subject has many effects on health and

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quality of giving nursing care.[2] Nurses are under the effect of many factors such as musculoskeletal disorders, digestive problems, fatigue, stress that can affect their occupational health.[3, 4] Researcher's surveys about stress role I different situations that here, the effect of stress on workers of the department of health part are impressive because of work complexity and it is recognized as an important and effective factor.[5-7] Because of the nature of the nursing job, this job considered a highly stressful job and the existence of high stress in this job leads to physical and mental disorders in nurses. [8] Based on the definition of the national institute of occupational safety and health (NIOSH), job stress occurred when there is no coordination between job needs with abilities, capabilities, and persons wanting .[6] Long term stress affects physical and mental health and it suppresses the immune system, disorder in the reproductive system, memory destruction and depression.[9] United Nations in 1992 introduced job stress as sickness of the 20th century. Sometimes later, world health organization, announces job stress as a pandemic problem in the world.[10]

Results of Peterson et al study in 2008 in Sweden shows that mental disorder especially depression and stress, is one of the most important reasons of long term sick leave (more than 12 months) in women (33%) and it is the second reason of sick leave in men (20%).[11] World health organization based on sick world indexes, also estimates that mental illnesses such as the stress of mental disorders are the second reason of inability up to the year 2020.[12]

Job satisfaction is a very important subject in organization studies. And in many backgrounds such as nursing has been studied. Studies about job satisfaction had done for the first time in 1920 and it studied with different instruments and in different populations. Evidence shows that different factors such as in job, personal, professional, and organizational and job environment can affect jab satisfaction.[13, 14] The purpose of job satisfaction is how the employee's feelings about the job he/she has. In the year 1998, based on the definition of Davit and Gieger Job satisfaction defined as a nurse feeling about this subject that to what extent his/her needs fulfilled by his/her job.[15-17]

Musculoskeletal disorders related to work (WMSD) is the most important problem of nurses.[18] Musculoskeletal disorders in workers of health care are a common thing in nurses' population that is about 33% of workers in hospitals are at high risk.[19] In daily works, nurses had many physical activities such as displacement and pick up patients, repetitive bending to forward. [20] It has been reported that musculoskeletal disorders have much effect on life quality and it loses work time and increases in job limitation.[19, 21]

Most problems of musculoskeletal disorders in nurses are reported about the lower part of the waist and after that neck, shoulder and knee pain. In studies, the outbreak of musculoskeletal disorders reported about 70 to 90 percent in the nursing job. [20] It is very important that we can decrease the nurse's complaints about physical problems. Also, signs in the waist region can lead to an outbreak of signs in other parts of the body.[22] By regarding the key role of hospital staff in giving health services to patients, this study had been done with the aim of the survey about the relationship between stress amount and job satisfaction with musculoskeletal disorders in nurses.

Methods

This study was the description, analytical that had been done in 2017 from 140 people, 90 people of available nurses that were in the nursing station during sampling in one of Tehran hospitals. Before distributing a questionnaire between people, by regarding ethical principles approved by the medical ethics committee of the university, whole explanations about research aims, how to fulfill questionnaires and confidentiality of information gave to all participants. Validity and reliability of the questionnaire approved by other researchers with Cronbach's alpha of 96%.[23, 24]

For data gathering, they used a questionnaire composed of demographic information and under survey information. Demographic part composed of questions such as age, gender, height, weight, job hours and resting hours in day and night, exercise time amount in a week and smoking. In part two of the questionnaire, the survey mostly used posture by nurses and the amount of satisfaction and their job stress. Surveyed items in participant's posture compose of carrying and displacement of heavy instruments, waist bending and complexity, repetitive movements, arm and hand movements, log sit or stand up and distance of hands from the body, also another part of the questionnaire was about pain in different parts of the body. All questions of this questionnaire were on a scale of zero to ten.

In this study to survey the relationship between components of the questionnaire, two special variables of

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posture index and job strain created. Posture index variable gained with the calculation of the average of posture score of each person and job strain variable by the difference in stress score and job satisfaction, job strain index scale were from -10 to +10 that this scale defined in 0 to 10. For surveying with other scales, how to convert this scale is in table 1. Data of this questionnaire collected quantitatively and for surveying about relation between variables they used SPSS 20.

Results

From 90 nurses that participate in this study, average age of men and women were 33.3(8.69) and 35.98(10.3) years. In table 2, under study people personal information is in summary.

The average score of satisfaction amount and people's stress was 5.88 2.36 and 6/83 2.34. The first normality test was on data and after observation of data normality, statistical tests performed. For surveying about the relationship between stress and job satisfaction in two men and women groups, they used an independent t-test. By regarding the results of these tests, significant satisfaction and job stress were not observed between men and women. The average score of job satisfaction in men and women are in table 3.

To survey the relationship between stress and job satisfaction with job postures they used correlation statistical analysis that there was a significant relationship between job stress ad job postures that results are in table 4. In this test, there is no significant relationship between job satisfaction and job postures. Also by using the correlation coefficient between the average score of postures (posture index) and variable of job strain examine of relation done that a significant relation had been seen. (*P*-value=0.006).

By surveying completed questionnaires most used job postures were about long-term sit-down and stand up, repetitive gestures and waist bending. In table 5 the average score of used job postures given. Examination of the relation between used postures and pain signs in different parts of the body done by correlation test. The results of this examination of the relation are in table 6.

By regarding collected information from the questionnaire it has been specified that one of the most used postures by nurses is waist bending that its result is a pain in inferior areas of the waist (table7). In this study, used posture by nurses divided into three parts of little (16.7%), medium (37.8%) and high (45.6%) and also pain in inferior areas waist divided to three parts of little (27.8%), medium (30%) and high (42.2%). By regarding analysis by SPSS20 and doing multivariate linear regression, a model for predicting pain in inferior areas resulted from waist bending gained that below we pointed to this model. The correlation coefficient between the posture of waist bending and pain in the inferior area of the waist was +0/293 that shows a direct relation between pains in the inferior part of the waist bending posture.

Y= 3.19 + 0.34X

Y= pain in inferior area of waist

X: waist bending posture

Table 1. How to correct job strain score

Job Strain Score	-9, -10	-7, -8	-5, -6	-3, -4	-1, -2
Corrected Score	1	2	3	4	5
Job Strain Score	1, 2	3, 4	5, 6	7, 8	9, 10
Corrected Score	6	7	8	9	10

Table 2. Personal features of people in study

Personal features		Number (percent)
Gender	Male	26 (28.9)
	Female	64 (71.1)
Working hours in day and night	Less and equal than eight hours	43 (47.8)
	More than eight hours	47 (52.2)
Resting hours in day and night	Less and equal than eight hours	84 (93.3)
	More than eight hours	6 (6.7)
Weekly exercise hours	Less than three hours	74 (82.2)
	Three hours and more	16 (17.8)

Table 3. Average of stress score and job satisfaction divided by gender

Gender	Average score of job stress (standard deviation)	Average score of jab satisfaction (standard deviation)
Male	7.30 (1.69)	5.76 (2.28)
Female	6.64 (2.54)	5.93 (2.41)

Table 4. Relation between stress and job postures

job posture	*P*-value	correlation coefficient
Freight and heavy equipment displacement	0.001*	0.24
Bending and Complexity of the Waist	<0.001*	0.36
Repetitive gestures	0.009*	0.27
Intense hand and arm movements	0.010*	0.27
Long-term Sit down and stand up	0.010*	0.25
Distance of hands from body	0.009*	0.27

Meaningful level was considered equal to 0.05.

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Table 5. Average score about each posture in under study people

job posture	Average score (standard deviation)
Freight and heavy equipment displacement	4.47 (3.03)
Bending and Complexity of the Waist	6.03 (2.65)
Repetitive gestures	7.27 (2.20)
Intense hand and arm movements	5.82 (2.76)
Long-term Sit down and stand up	7.92 (2.13)
Distance of hands from body	4.93 (2.91)

Table 6. Results of Pearson correlation test for surveying relation between posture and pain areas

posture	Pain region	*P*-value*	R**
Carry and displacement	Wrist and arm	0.020	0.19
	Lower part of waist	0.000	0.21
	Thigh and hip	0.035	0.20
	knees	0.002	0.29
	shoulder	0.020	0.10
Waist bending	Lower part of waist	0.001	0.29
	knees	0.029	0.18
Intense hand and arm movements	Wrist and arm	0.015	0.20
Distance of hands from body	Lower part of waist	0.015	0.23

*P-value = meaningful level** ، R = correlation coefficient
Meaningful level was considered equal to 0.05.

Table 7. Relation between pains in lower part of waist with independent variables

Independent variable	β	*P*-value
Carry and displacement	0.75	>0.05
Waist bending	0.34	<0.05*
Distance of hands from body	0.54	>0.05

Meaningful level was considered equal to 0.05.

Discussion

By regarding results the highest used posture between nurses was long-term sit or stand up that gave the highest score to itself. After examining the relationship between posture and job stress score it recognized that there is a significant relationship between these variables. A result shows that jobs that need high physical and physiological needs and there is a little control in-car can increase job stress and the probability of musculoskeletal disorders increases. [25] Based on a study that Deh dashti et al done in 2017 between nurses there was a significant relationship between musculoskeletal disorders complaints and job stress.[26]In another study done in 2016, it showed that musculoskeletal disorders increase job stress[27] also in the study done by Rahimi Moghadam in 2017 on hospital staffs it showed that between musculoskeletal disorders and job stress there is a significant relation.[28] The highest significant relation was between job stress with bending or waist complexity (P-value<0/001) in study done by Abaraogu in the year 2016 on 126 persons of cure staff of hospital, it recognized that these people have high level of job stress and 82% of these staff in last year has pain in one of the body limbs. [29]

For more survey between variables, two variables of posture index and job strain surveyed that result of this survey showed that there is a significant relationship between job strain and posture index (*P*-value=0/006) by regarding done analysis it recognized that the highest relation between given posture and pain in different parts of body is between waist bending and pain in inferior part of waist. In study by Riberio et al in 2016, it recognized that having long unsuitable posture leads to musculoskeletal disorders in nurses, in this study the most common disorder was for pain in inferior part of waist,[30] also by done studies it recognized that highest musculoskeletal disorders pain in nurses is about waist region.[31-33]

Analysis between job satisfaction and job posture and statistical analysis had been done and was observed there is no significant relationship between these two. Also in an independent t-test, it was observed that in two groups of men and women, satisfaction and job stress were the same and there is no significant relation. In the study done in 2013, it recognized that job stress in two groups of men and women has no significant difference. [34] In the study done by Habib and Shirazi, 61% of the hospital staff was satisfied and 39% were not satisfied. [35] From cases that lead to dissatisfaction in nurses we can point to long hours of working, much work, irregular job schedules, doing forced works, high work request and work stresses.[36] Nurses who have high job satisfaction, do their job n a good way on the point of psychological and they have the higher organizational obligation.[37]

Conclusion

High physical activities lead to having unsuitable and repetitive postures in nurses that are one of the important factors in creating job stress in nurses. For stress decreasing to people, one should give needed train and information about having correct posture in work to staff. Having unsuitable posture also leads to pain in different parts of the body that one of the most common pain signs is a pain in the waist region. Waist bending is one of the most

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important postures that are effective in creating pain in the waist region. Based on done studies, improvement and correction of situation and job relations leads to increase in job satisfaction and decrease of job stress to staff.[38]

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