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# Relationship Between Musculoskeletal Disorders and Job Performance among Nurses and Nursing Aides in Main Educational Hospital in Qom Province, 2014

[1]Mohammad Khandan, [2]Zeinab Eyni, [2]Leila Ataei manesh, [2]Zahra Khosravi,
[3]Hamed Biglari, [4]Alireza Koohpaei, [5]Mohsen Poursadeghiyan
[1] Department of Ergonomics, Health Faculty,
[2]Department of Occupational Health, Student Research Committee,
Qom University of Medical Sciences, Qom, Iran
[3]Department of Environmental Health Engineering, Faculty of Public Health,
Social Development and Health promotion Research Center,
Gonabad University of Medical Sciences, Gonabad, Iran
[4] Department of Occupational Health, Health Faculty, Work Health Research Centre,
Qom University of Medical Sciences, Qom, Iran
[5]Department of Ergonomics, School of Rehabilitation, University of
Social Welfare and Rehabilitation Sciences, Tehran, Iran

**Abstract:** Musculoskeletal Disorders (MSDs) are one of the most common problems among health care workers specially nurses. MSDs lead to reducing Job Performance (JP) finally. This study was designed in order to examine the relationship between MSDs and JP among nurses and nursing aides in main educational hospital in Qom province in 2014. This cross-sectional study was conducted on 153 Nurses and Nursing aides. Our data was gathered with a demographic questionnaire and Paterson JP questionnaire. Also, body map was applied for ergonomic injuries assessment. The data was analyzed using t-test, ANOVA and Pearson correlation analysis in SPSS-20. The mean age was calculated equals to 32.16± 6.43 and the average work history 8.17±6.19 year. Based on the results, 142 Nurses (92.8%) reported that during the past year have experienced pain at least in one member of their body. Low back pain was reported to be the most one (59.47%). The mean scores of JP were 34.94±7.33. Difference between numbers of MSDs and JP in different hospital departments was significant ($p<0.05$). The prevalence of MSDs among nurses was high and JP has been above average. Due to the high prevalence of pain in various parts of the body the productivity and performance in the long time would be reduced and pose healthcare costs. Relevant authorities should consider intervention program with regards to organizational issues along with physical problems.

**Key words:** Ergonomics, occupational exposure, performance, nurses, nursing aides

## INTRODUCTION

Nurses as the largest and the most important part of the human resources in health care organizations are important for public health promotion; so that health care organizations cannot succeed without the efficient nursing (Hamid and Dehghanizadeh, 2012) because the failure of this group due to their important role in improving patient safety will bring irreparable consequences (Nasiripour *et al*., 2009). According to estimates, nurses and nursing aides have a share of about 40% of hospital staff. Females are in majority in in the profession and face with a range of critical issues in their work and they need to deal with patients in their physical and mental sever conditions (Smith *et al*., 2006). Also, physical activities such as daily services to patients, including personal hygiene, dressing, eating and entry of medicine to the patients, the displacement of patients for therapeutic and paramedical purposes are abound in the nursing profession. Musculoskeletal Disorders (MSDs) are defined as complications and damages to muscles, nerves, tendons, ligaments, joints, cartilage and spinal column and Work-Related Musculo Skeletal Disorders (WRMSDs) refers to musculoskeletal injuries that resulted from a work-related event (Barboza *et al*., 2008). WRMSDs have been considered as one of the major challenges in ergonomics and occupational health in recent decades that in addition to make reduction in efficient working

**Corresponding Author:** Mohammad Khandan, Department of Ergonomics, Health Faculty, Qom University of Medical Sciences, Qom, Iran

time, restrict or change job, have led to adverse effects on physical and mental health, quality of work life and brought social costs Allahyari *et al*., 2014; Maul *et al*., 2003), According to official statistics, 25% of workers in Europe Union complain of backache and 23% of muscle pain. MSDs are one of the main health problems among personnel of health services and it is an important cause of disability in nursing (Solidaki 2010; Coggon *et al*., 2013; Raeisi *et al*., 2013).

This issue is the leading cause of absenteeism of nurses and nurses' assistances (Menzel, 2008) and could adversely affect the work life quality, cause job burnout and chronic fatigue and reduce their performance (Haddadi *et al*., 2015), leading to an increase in working days lost or lead to change the career (Choobineh *et al*., 2010). Employees are at risk of physical and psychological problems because of circumstances associated with their jobs (Dadarkhah *et al*., 2013), MSDs are considered as the second cause of absenteeism in the workplace after respiratory problems also it causes dysfunction of staff and are considered as one of the occupational injuries and disabilities in industrialized nations and developing countries (Raeisi *et al*., 2013; Choobineh *et al*., 2007). Due to the nature of the duties, nursing occupation is one of the jobs that faced with a high prevalence of MSDs (Abedini *et al*., 2012a). Karahan in a study on nurses in Turkey demonstrated that 1.77% of them experienced MSDs (Karahan *et al*., 2009). Studies have shown that poor postures, lifting and carrying and repetitive movements are risk factors for MSDs. Besides, psychological and social and demographic factors influence on the organizational environment (Dunn and Croft, 2004; Abedi *et al*., 2012). Because of physical and mental requirements and time pressure as one of the main problems of the profession, nursing is known as a high-risk job (Magnago *et al*., 2007). Manual handling activities as a common task in health centers could be contributing to adverse physical conditions (force, awkward postures and repetitive motions) and lead to disorders (pain, fractures and bruising) and waste energy and time. Lifting heavy loads is an important factor for the development of back pain (Habibi *et al*., 2012). In a study on 385 nurses has been reported that 89.9% of them have experienced some form of MSDs in the year before (Barzideh 2014). In another study, the rate was 88.2% (Abedini *et al*., 2012b). Job requirements like manual material and patient handling, poor postures and prolonged standing and sudden twists caused the nursing profession are among 10 first jobs that the risk of WRMSDs is high (Habibzade *et al*., 2008; Matsudaira *et al*., 2011). Nursing aides' jobs is the second career in the health care that suffers from the most disorders and occupational injuries in hospitals (Allahyari 2014; Maul *et al*., 2003). The main goal of any organization is optimum efficiency achievement and skilled, healthy and motivated manpower is one of the factors to guarantee the productivity. Job Performance (JP) of nurses as one of the most important human resources of hospitals, affected by several factors such as spirituality, organizational commitment and general health that would result in more commitment and increasing service quality or productivity (Hamid and Dehghanizadeh, 2012; Majumdar *et al*., 2014). Therefore, this study aimed to survey the relationship between MSDs and JP among nurses and nurse' aides of Shahid Beheshti Hospital in Qom (as main and central medical unit), 2014.

## MATERIALS AND METHODS

The study was cross-sectional and its statistical population was nurses and nurse's aides. One hundred and fifty three ones were selected in simple random from the pointed population. Data gathering tool in this study was a questionnaire composed of two main parts that with the distribution between individuals, necessary data was collected. Before completing questionnaires by the participants, they took training on how to complete and respond to the questions. The first part of the questionnaire consisted of 15 questions of Paterson's JP (Ghasemzadeh *et al*., 2013) and the Body Map (BM) (Choobineh, 2008) was the second part. Parts of the body exposed to damages ergonomics and MSDs were determined by BM. Questionnaires with demographic part including age, gender, work experience, education level and employment system were distributed among subject and then were collected. Data was analyzed using t, ANOVA and Pearson correlation tests through SPSS Version 20.

## RESULTS AND DISCUSSION

The total number of participants was 153, of which 100 (65.4%) were female and 53 (34.6%) were male. 103 (67.3%) of the responders were married and 50 (32.7%) were single. People had a minimum age of 21 and a maximum of 56 (with an average of 16.32±6.43), years. Working experience of samples had an average of 8.17 and standard deviation of 6.19 year. People were distributed in four groups of education levels of diploma or lower (n = 4), Higher Diploma (n = 8), Bachelor of Science (n = 137) and a Master of Science and higher (n = 4). Participants in Intensive Care Unit (ICU) were in majority

(24.8%) and people in injection unit were in lowest share (2%). 138 ones (90.2%) worked as shift workers and 15 (9.8%) were day working. About 142 nurses (92.8%) reported that have experienced pain at least in one member of their body during the past year. The most problem was in LB pain with 91 cases (59.47%) and left leg with 69 (45.09%) ranked the second (Table 1). Minimum JP scores was 14 and the maximum 45, its average and SD equal with 34.94 and 7.33, respectively. It should be noted that the mean score of questionnaire was 29.5. In this study, Cronbach's alpha coefficient was to 0.93 which shows the reliability of the questionnaire is acceptable.

According to conducted analyses it was found that marital status has no effect on the prevalence of MSDs ($p = 0.07$). But a quantitative comparison between married and unmarried participants depicts that married people more than single people are suffering from MSDs. In comparing JP and marital status were illustrated that marital status did not make difference in performance of individuals ($p = 0.11$). There was no significant difference between men and women regards to MSDs ($p = 0.10$), compared between the two groups, it was found that females are at risk for these disorders more than males. As a result of comparing JP and gender is a significant effect of gender on individual performance ($p = 0.01$), it was found that women had higher performance than men.

The type of shifts in the incidence of muscles' pain is not statistically significant ($p = 0.58$). But the day working people are more at risk. By investigating the relationship between JP and the type of shift was demonstrated that shift work affects the performance of the samples ($p = 0.02$). On the other hand, it can be seen that the performance of day working group is more than others (Table 2).

According to the results of analysis of ANOVA, the education level does not have any effect on the MSDs and the performance of employees ($p<0.05$). Pearson correlation indicated that work experience and JP ($p = 0.01$), age and JP ($p = 0.02$) had significant relationships and there was no relationship between age and musculoskeletal disorders ($p = 0.92$), work experience and MSDs ($p = 0.97$) as well as between MSDs and JP ($p = 0.55$) (Table 3).

Difference between the number of MSDs and JP in different units of the hospital were also statistically significant ($p<0.05$). Among different units, the Endoscopy unit with an average of 8.5 (±5.8) body parts was the first and heart unit with 1.5 (±1.52) had the least amount of disorders. Furthermore, the performance of the Post Cardiac Care Unit (PCCU) with an average score of 42.25 (±4.56) was the highest and emergency department with 28.62 (±7.22) was the lowest.

According to our data and similar to other works, most of the MSDs complaints were LB pain (59.47%) (Abedini *et al*., 2012; Trinkoff 2003; Ando *et al*., 2000). It seems that differences in incidence rate of the MSDs in different studies is related to factors such as age of nurses, their work experience as well as medical equipment technology. For example, 37% of nurses working in Japan are involved in MSDs (Matsudaira *et al*., 2011). The numbers for Turkish nurses have been reported 77.1% (Karahan *et al*., 2009) and the Egyptian equals of 63.8%. LB pain among Iranian nurses with 61.8% has been similar to other developing countries (Abedini *et al*., 2012).

Table 1: The prevalence of MSDs in the last year (BM) (n = 153)

| Body part | Frequency | % |
|---|---|---|
| Neck | 63 | 41.17 |
| **Shoulder** | | |
| R | 31 | 20.26 |
| L | 29 | 18.95 |
| **Back** | | |
| Upper | 21 | 13.72 |
| Lower | 91 | 59.47 |
| **Arm** | | |
| R | 5 | 3.26 |
| L | 7 | 4.57 |
| **Leg** | | |
| R | 68 | 44.44 |
| L | 69 | 45.09 |
| **Elbow** | | |
| R | 15 | 9.80 |
| L | 10 | 6.53 |
| **Butt** | | |
| R | 14 | 9.15 |
| L | 19 | 12.41 |
| Hand | | |
| R | 20 | 13.07 |
| L | 21 | 13.72 |
| Thighs | | |
| R | 31 | 20.26 |
| L | 29 | 18.95 |

Table. 2: The relationship between demographic, MSDs and JP (n = 153)

| | Gender | | Marital status | | Shift | | Disorders | |
|---|---|---|---|---|---|---|---|---|
| Demographic factors | Female | Male | Single | Married | Yes | No | Yes | No |
| Frequency | 100.000 | 53.000 | 50.000 | 103.00 | 138.00 | 15.00 | 142.0 | 11.00 |
| Disorders' mean | 4.090 | 3.280 | 3.220 | 4.09 | 3.76 | 4.20 | - | - |
| Performance's mean | 35.960 | 33.010 | 33.580 | 35.60 | 34.66 | 37.46 | 34.84 | 36.27 |
| Disorders (Sig.) | 0.101 | 0.079 | 0.699 | - | | | | |
| Performance (Sig.) | 0.018 | 0.110 | 0.029 | 0.355 | | | | |

Table. 3: Correlation coefficients between demographic, MSDs and JP (n = 153)

| Age | Coefficient | Age | Work experience | Disorders | Performance |
|---|---|---|---|---|---|
| | 1 | | | | |
| | Sig. | | | | |
| Work experience | Coefficient | 0.912** | 1 | | |
| | Sig. | 0.001 | | | |
| Disorders | Coefficient | 0.007 | -0.003 | 1 | |
| | Sig. | 0. 929 | 0.975 | | |
| Performance | Coefficient | 0.184* | 0.208* | 0.048 | 1 |
| | Sig. | 0.023 | 0.010 | 0.555 | |

*,**p<0.05, 0.01

In the present study, 92.8% of nurses said that had experienced pain at least one member of his/her body during the past years. Sharifnia in their study revealed that 81% of nurses had experienced low back pain at least once during the last year. In the same range Barzideh (2014) have been reported the amount equals to 89.9%. Based on the lower age and work experience of the studied nurses than nurses working in other countries (Solidaki *et al*., 2010; Abedi and Rostami, 2012), we observed high level of the musculoskeletal pain incidence among nurses and nursing aides surprisingly. However because severe physical activity and poor postures, pain is occurred in lower age and work experience.

According to Table 1 most of the pain incidence has been reported in the LB, legs and neck area. Results obtained from a study on 627 nurses working in India were similar to our results (Majumdar *et al*., 2014). Also Sorour in Egypt reported the highest rate of disorders for the neck, shoulder and LB areas. In a study that was conducted by Abedini *et al*. (2012) the most common area for MSDs was LB, legs, hands, neck and shoulders. In a study that was conducted by Nakhaei Birjand hospitals, the highest amount of pain were reported for the legs, back, shoulders, neck and wrist (Nakhaei *et al*., 2006). The results of the Chubineh. showed that pain in the back, leg, knee and shoulder was common in health care workers (Choobineh, 2007; Abedi *et al*., 2012). About the high prevalence of LB pain, neck and knee than other MSDs can be said that the possibility of damages to lumbar vertebrae in nurses/nursing aides is high when patients transfer are required as well as sudden poor/awkward postures. Patients transfer or their change positions when medical treatment requires a set of poor posture from nurses/nursing aides including twisting and bending movements as well as repetitive motions. This situation that is dictated from job requirements and demands leads to high forces on body and pain finally. So it can be concluded that the prevalence of lumbar symptoms is related to patient transfer or manual handling activities and health care workers with more physical activities, experience more ergonomics problems than others (Dadarkhah *et al*., 2013).

Based on the results of Table 2, similar to other work between MSDs and marital status, there was no significant relationship [34], however married people more than singles were at the risk of MSDs incidence in the line of Ramezani (Ramazani *et al*., 2006). Also Dadarkhah in a study that were conducted in 2013 (Dadarkhah *et al*., 2013) and (Majumdar *et al*., 2014) were found similar results. Although, relationship between the pain incidence and gender was not significant (p>0.05) but more incidence was reported for women than men due to her lower physical strength and specific physiological conditions. Sex and shift working were influenced on the performance of nurses and nursing aides (p<0.05). Although, day working nurses and nursing aides had more complaints about pain but had been shown better performance (Table 2). According to the author's opinion, increasing performance of day workers is returned to better supervising and monitoring of their activities during the day. However, higher referring and major clinical activities during the day, leads to more musculoskeletal pain complaints among health care day workers.

In nursing, there are various tasks that associate with patient handling as work demand. In the other hands repetitive tasks leads to musculoskeletal problems among nurses (Nakhaei *et al*., 2006; Menzel *et al*., 2004; Caruso and Waters, 2008). In this situation preventive and corrective strategies such as training courses about body mechanics, work techniques, changes in physical job stress aided by the ergonomic processes and accessories equipment (for physical stress and injury prevention among nurses as well as patient wellbeing and safety) are recommended (Nakhaei *et al*., 2006; Abedi *et al*., 2012). In addition other factors such as organizational and managerial factors can help to improve working conditions in order to create a proper climate, job satisfaction and motivation, high job control and social support for nursing (Barati Ahmadabadi *et al*., 2010). Based on this fact that we cannot change individual factors such as age, gender and marital status, reduction and control of other risk factors for MSDs is recommended.

**Abbreviations:**

- (MSDs) Musculoskeletal Disorders
- (WRMSDs): Work related Musculoskeletal Disorders
- (JP): Job Performance
- (BM): Body map
- (LB): Low back
- (ANOVA): Analysis of Variance
- (ICU): Intensive Care Unit
- (PCCU): Post Cardiac Care Unit

## CONCLUSION

The results of this study showed that the incidence rate of MSDs was high in nurses and nursing aides. However, the nurses and nursing aids JP scores were assessed above average surprisingly. Given that high incidence rate of LB and leg pain that lead to lower productivity and performance as well as high costs and disability, relevant policy-makers should paid attention to an intervention program development aimed to prevent and reduce the ergonomic challenges in health care sectors. It is believed that our results could be applied to development and implementation an integrated macro-ergonomics/psychosocial program to reducing organizational pressures on nurses in the health care sectors. It is anticipated that this approach can lead to human error reduction as well as patient's safety improvement and MSDs control finally.

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