Relationship between Job Content and Demographic Variables with Musculoskeletal Disorders among Nurses in a University Hospital, Qom Province, 2014

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Abstract: Nurses due to the work physical and psychological requirements leads to Musculoskeletal Disorders (MSDs) and because job stress/strain would be lose their health finally. This study was designed to evaluate relationship between Job Content (JC) and demographic variables with MSDs among nurses working in an educational hospital in Qom in 2014. A cross-sectional study was conducted on 150 nurses. Data was gathered in this study in addition to demographic questionnaire with a reliable Karasek JC questionnaire. Also, using with body map musculoskeletal pain was identified. The data using t-tests, ANOVA and Pearson correlation in SPSS-V22 were analyzed. The subjects mean age was 31.65 with a Standard Deviation (SD) of 7.02 years. Nurses' work experience was reported equals to 8.25±7.04. Based on the obtained results, 128 nurses (85.3%) have experienced pain in at least one part of their bodies. The highest prevalence of MSDs was reported in lower back (38%). Results showed that the mean score of JC for studied nurses was higher than the average (46.27±5.90). Also with Pearson test it was revealed that with increasing physical and mental job stress incidence of MSDs would increase. The prevalence of MSDs was high and JC was above the average. It seems that continuation of this situation in the long time can cause more stress and reduce the job satisfaction and motivation of health care personnel. Also, it is anticipated that decreased patient safety would be a consequences of mentioned condition.

Key words: Ergonomics, occupational strain, job content, job stress, nurses

INTRODUCTION

Based on the NIOSH (2008) nursing has been considered as stressful and dangerous job. Statistics show that the rate of injuries and occupational diseases is twice of other occupations (Bureau of Labor Statistics, 2009) and in some cases such as force exertion, falling or violence in the workplace is 65-260% more than workers in other organizations and industries at risk (Vessey *et al.*, 2010; Yildirim, 2009; Johnson, 2009).

It is estimated that nurses working in general hospitals are in exposure with 300 chemicals, including cleaners, disinfectants, dangerous drugs and gases in average (NIOSH, 2002). On the other hand, nurses are faced with physical violence. A study showed that 40.5% of nurses had experienced physical violence (Qiu *et al.*, 2012). About 67% of Australian nurses were experienced verbal violence in a period of 1 year (Mayhew and Chappell, 2005).

Because nursing requires considerable physical and mental activities also there are high amounts of harmful physical, chemical, biological, mechanical and psychological agents in hospital environment, due to the more presence time; nurses are at risk for injuries and occupational diseases more than other workers in the health care sector (Hamid and Dehghanizadeh, 2012).

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Studies based on hospital anxiety and depression index have demonstrated that 27.3% of nurses were in the alarming state of anxiety and depression (Mark and Smith, 2011). The rate was estimated at 14-18% in the public population (Mark and Smith, 2011).

In addition, 44.8% of nurses believed that in the year before suffered from a disease that either caused by stress or exacerbated by it (Mark and Smith, 2012). Other epidemiological studies have identified that there is relationship between the incidence of cardiovascular disease (Backe *et al.*, 2012) immune system problem (Nakata, 2012) hypertension (Landsbergis *et al.*, 2013) depression (Bonde, 2008) on the one hand and psychological and social factors on the other hand (Alexopoulos *et al.*, 2015). Burn-out, decreased quality of life and intention to leave the job are also other common issues among nurses (Lin *et al.*, 2009).

Some studies have shown that 30-50% of all new hired nurses decided to leave their jobs in the first three years of their careers (Cowin and Hengstberger-Sims, 2006).

Another research on >43000 nurses in 5 countries illustrated that 17-39% of subjects were going to leave the job the following year due to work-related psycho-physical pressures (Choobineh *et al.*, 2007).

Nurses also face with a high risk of ergonomic disorders (Choobineh *et al.*, 2011). Musculoskeletal Disorders (MSDs) are considered as a major cause of disability and medical leave of absence in the workplaces (Karahan *et al.*, 2009; Majumdar *et al.*, 2014).

These disorders are a main cause of occupational injuries in developed and developing countries and it is the major reason for the loss of work time, increasing labor costs and harms to workforce (Abedini *et al.*, 2012). Nursing needs great physical activities. Physical work increases the risk of MSDs in the neck, shoulder and back 9-12 times among nurses (Choobineh *et al.*, 2007).

Low Back (LB) pain is the most common MSDs between nurses with a prevalence of 30-60% and then shoulder with 43-53% and neck pain with 30-48% of prevalence are in the next rankings (Nasiripour *et al.*, 2009).

Research on Iranian nurses has posed that over 80% of studied nurses had experienced ergonomic disorders in one or more parts of their bodies (Allahyari *et al.*, 2014). Several factors are involved in the disorders that can be divided into physical factors such as lifting, carrying heavy loads, awkward posture, work with repetitive motions and psychosocial factors like work demand, nature of work, decision-making latitude, social support and control of individual on the work (Viotti and Converso, 2016).

Smith *et al.* (2006) found out that workplaces with high MSDs suffered from low support from co-workers, low freedom of decision and little autonomy, lack of transparency, responsibility, stress and high working pressure and low job satisfaction (Smith *et al.*, 2006).

In a study on 522 Italian nurses was presented that the skill and power to make decisions had direct effect on reducing emotional exhaustion, intention to leave the job and job satisfaction (Viotti and Converso, 2016).

Job Content (JC) questionnaire based on support-control-demand model is designed to measure psychological and social characteristics and predicts psychological and health outcomes (Alexopoulos *et al.*, 2015) and has been successfully used among the Iranian nurses (Choobineh *et al.*, 2011; Tabatabaee *et al.*, 2013).

Along with previously mentioned risk factors in health care environment, previous studies have shown that Iranian nurses are more exposed to occupational strain than ones in other countries (Barzideh *et al.*, 2014).

Therefore, this study objected to investigate the relationship between physical activity and mental factors and demographic variables with Work-related Musculoskeletal Disorders (WMSDs) among nursing in Kamkar-Arabnia as an educational hospital of Qom University of Medical Sciences in 2014.

It is believed that the results of this research will provide effective stress management strategies in order to prevent physical and psychological strain and their effects.

MATERIALS AND METHODS

This study is a cross-sectional study that has been conducted on 150 full-time or part-time nurses working in Kamkar-Arabnia hospital in Qom, 2014. Questionnaire was used to collect data. Before completing the questionnaire, the necessary explanations about study's aim and how to answer questions were given to nurses, also if they were satisfied then would be enrolled in the study. They were also noted that if they wish they could withdrawal from the study without any consequences.

The questionnaire consisted of three parts: the first part included questions about demographic characteristics including age, sex, marital status, exercise, work system and working hours per day and the second part was Body Map (BM) that assessed the prevalence of MSDs in different parts of the body in the past 12 months.

The 3rd section JC Questionnaire was utilized to measure perception and judgment of nurses regards to their physical and psychological strain in their work environment.

Data analysis was done using SPSS Version 22. Descriptive statistics was applied to calculate the mean and Standard Deviation (SD) and to determine the

relationship between demographic factors with MSDs and JC, t-test and Pearson's correlation coefficient have been applied. Furthermore, comparing means of quantitative variables was analyzed by ANOVA.

RESULTS AND DISCUSSION

The mean age was 3.65 with a SD of 7.02 and in the range of 20-54 years. Nurses' work experience was reported 8.25±7.04 years. Over two-thirds of participants were female and their majority bachelor of science. Most of subjects were married and in shift working system with the mean of 9.25 h working in a day. The demographic characteristics of responders are obvious in Table 1.

Table 1: Qualitative demographic factors description (n = 150)

Variables	%	Frequency
Gender		
Male	30.7	46
Female	69.3	104
Marriage status		
Married	64.7	97
Single	35.3	53
Education		
Diploma or lower	1.3	2
Associate's degree	8.0	12
Bachelor	88.7	133
Master or higher	2.0	3
Working system		
Shift working	4.0	6
Day working	96.0	144
Sport		
Regular	9.3	14
Irregular	90.7	136

Table 2: The prevalence of MSDs in the last year (BM) (n = 150)

Body part	Frequency	%
Neck	47	31.34
Shoulder		
R.	39	26.00
L.	25	16.67
Back		
Upper	16	10.67
Lower	57	38.00
Arm		
R.	11	7.34
L.	6	4.00
Leg		
R.	33	22.00
L.	34	22.67
Elbow		
R.	17	11.34
L.	13	8.67
Butt.		
R.	8	5.34
L.	7	4.67
Hand		
R.	27	18.00
L.	12	8.00
Thighs		
R.	26	17.24
L.	31	20.67

R.: Right side, L.: Left side

The results of BM posed that the average of WMSDs in the studied population was 3.71. The prevalence of MSDs in the past 12 months is provided in Table 2. About 128 ones (85.3%) reported that had experienced pain at least in one part of their bodies in the past year.

The highest rate of disorders was reported in LB (38%), then neck (34.31%) and right shoulders (26%). The average of JC, according to the questionnaire in the studied nurses was 46.27 with a SD of 5.90 and minimum and maximum scores achieved 28 and 63, respectively.

Respect to the cut-off point of 45.5 to determine the status of physical and mental pressure, it was clear that JC' mean was higher than the cut-off point. In the present study, Cronbach's alpha coefficient was 0.645 so; JC questionnaire's reliability is acceptable.

Tests' results showed that gender (p = 0.32), marital status (p = 0.789), second jobs (p = 0.261) and working system (p = 0.235) did not make any statistically significant difference about WMSDs. But in terms of quantity, men more than women, married people more than singles, people working in shifts more than day working people and people who do not have a second job more than those who are working in other jobs experienced WMSDs.

ANOVA illustrated that relationship between education level and WMSDs was not statistically significant (p<0.05).

Pearson correlation demonstrated that there was no statistically significant relationship between age and working hours with the prevalence of MSDs (p<0.05). However, a significant relationship was observed between work experience and WMSDs (p = 0.048). According to the correlation coefficient (0.162), MSDS will rise with increasing work experience. The results of the relationship between variables are presented in Table 3.

It was also diagnosed that the sex (p = 0.621), marital status (p = 0.517), second job (p = 0.856), working system (p = 0.25) and JC was not significantly associated (p>0.05).

Table 3: Correlation between demographic, MSDs and JC (n = 150)

Results	Age	Work experience	Working hours	MSDs	JC
Coefficient	1				
Sig.					
Coefficient	0.930**	1			
Sig.	0.001				
Coefficient	0.064	0.074	1		
Sig.	0.437	0.365			
Coefficient	0.145	0.162*	0.177	1	
Sig.	0.077	0.048	0.154		
Coefficient	0.074	0.087	0.039	0.239**	1
Sig.	0.365	0.292	0.634	0.003	

*p<0.05; **p<0.01

But considering quantity, females perceived more mental and physical strains than males and also married ones more than singles, nurses in day working style more than shift working ones and people who do not have a second job more than those who are working in other jobs. The results showed that physical and mental pressure did not differ among various groups of nurses with different levels of education (p>0.05).

In addition, Pearson correlation depicted that there was no significant relationship between the age, work experience and working hours with JC (p>0.05). JC and WMSDs were significantly related (p<0.05) and considering the correlation coefficient (0.239) while physical and mental strain of job increases the incidence of MSDs will rise.

Based on our data the highest prevalence of MSDs was LB (38%), neck (31.34%) and right shoulders (26%). Similar to the results of this study, more studies have been reported that most of the nurses' ergonomic complaints were LB pain, neck and shoulders as well as leg pain (Nasiripour *et al.*, 2009; Allahyari *et al.*, 2014; Raeisi *et al.*, 2013; Nutzi *et al.*, 2015). In the present study, LB was the most complaints body area. In line with our results, Barzideh *et al.* (2014b) showed that 89.9% of nurses have been experienced pain in one or more areas of their bodies as well as LB pain with a prevalence 61.8% was allocated to the highest disorders.

Abedini *et al.* (2012) revealed that highest incidence of LB pain have been reported equals to 71.5%. Also, Raeisi *et al.* (2013) had found same results. They found that prevalence of LB pain was the most common disorder with 56.8%, then upper back pain and neck with 47.6 and 47.4%, respectively.

In addition Haghdoost *et al.* (2011) in a study revealed that rate of MSDs in LB was 81%, knee 63.5%, neck 50% and shoulders pain 35.5%. As well as Dadarkhah *et al.* (2013) in their study found that the highest prevalence of MSDs were reported in LB area with rate of 47.8% (Choi *et al.*, 2015).

Working in standing postures more than half of the work shift, unsuitable manual handling, patients transfer, patients' treatment processes (such as injections, dressing, etc.), repetitive motions, poor postures when working in nursing stations and improper installation of Video Display Terminals (VDTs) in hospitals are main risk factors of WMSDs.

Also work-family conflict is among the main causes that can lead to MSDs (Nutzi *et al.*, 2015). In our research that was conducted on relationship between JC and demographic variables such as gender, shift working, marital status, second jobs, education level, age, work experience and hours of working on MSDs it was determined that was a significant relationship between work experience and MSDs (p<0.05). However, in viewpoints of quantitative, for men, married persons, day working people and people without second job, MSDs was higher than others. It seems that the nurses without second job, spent more time in the hospital hence due to fatigue, reported more problems.

In the assessment of the relationship between demographic variables with the job physical and mental strain, it was found that there was not significant relationship between mentioned factors and the JC (p>0.05). However, similar to MSDs we observed quantitative JC differences (greater strain) for women, married people, day working people and people without a second job. The results also showed that the relationship between JC with MSDs was statistically significant (p<0.05).

The average of the JC among studied nurses was high. About JC there are different definitions in literatures. Some researchers define JC as a mismatch between workers skills and capabilities in one hand job demands in other hands. In other documents JC is related to negative factors such as role conflict, role ambiguity, role overload and poor working conditions (Choi *et al.*, 2015; Karasek, 2008).

In a study on 424 nurses in Macau using structural equation model, the relationship between occupational physical and mental risk factors with emotional exhaustion and personality disorders were approved (Hu *et al.*, 2015).

On this basis it seems that, burn-out issue (Adriaenssens *et al.*, 2015), should be considered by hospital managers seriously. It is known that in a similar situation with the results of this study, factors such as stress due to job demands, the lack of attention, respect and appreciation, problem in communicating with colleagues and superiors as well as nurses concerns about the lack of promotion and development as well as job insecurity leading to job dissatisfaction and turnover of the nurses (Tao *et al.*, 2015).

It seems, the development of educational and training courses aimed to address the shortcomings in all health care services would be lead to high efficiency and safe operation of the medical tasks.

Based on some studies the relationship between stress and ergonomic disorders resulting is not clear. For example Chubineh in contrary with present study explored that was not a significant relationship between JC with MSDs (Choobineh *et al.*, 2007). This issue has been discussed in various studies. Bonzini in a longitudinal study designed a paper entitled "Is musculoskeletal pain a consequence or a cause of occupational stress" (Bonzini *et al.*, 2015).

However, in line with our results, there are many studies that relation between MSDs and psychological issues, such as somatising tendency, lack of job satisfaction and job stress was proved (Palmer *et al.*, 2005).

Although, it should not be forgotten that MSDs can lead to greater sensitivity about working mental conditions. On the other hand, in the view points of better documentation there are general tendency to be aware of and more report about their health problems such as MSDs (Bonzini *et al.*, 2015).

In a study that was conducted in France on nurses, it is revealed that 59.3% of nurses had reported job stress as well as 54.4% of them had a low quality of life (Bellagamba *et al.*, 2015). Also among Italian nurses showed a direct and positive effect on emotional exhaustion, intention to leave and job satisfaction by decision-making skills (Viotti and Converso, 2016).

In another study in Brazil 60.8% of nurses had experienced high job demands and 71.8% of them had reported low control and 85.5% of them had complaints from low social support (Silva and Guimaraes, 2016).

Barzideh *et al.* (2014a) in their research found that there was a significant relationship between mental and psychological needs in WMSDs. Results of the Habibi *et al.* (2012) work showed that work demand and social conflict had a significant correlation with LB pain.

Due to the impact of psychosocial factors on job stress (Ruotsalainen *et al.*, 2014; Iavicoli *et al.*, 2015) and also this fact that Iranian nurses have experienced risk of occupational stress more than their colleagues in other countries (Barzideh *et al.*, 2014) implementation of a comprehensive stress management program is recommended in health care sectors such as hospitals.

A study on nurses in Sanandaj showed that stress management besides to personal ability and defense style was related to workplace and organizational factors (Laal, 2013).

Extensive researches in different organizations have been shown that using of job resources such as increasing job skills, educational opportunities, self-esteem, support by colleagues and superiors, proper feedback and participation in decision-making is conducted to job pleasure and high job commitment and performance even in the existence of high workload and job emotional demand (Bakker *et al.*, 2010).

The application of this approach as well as integration of psychosocial factors in health promotion programs is recommended.

CONCLUSION

According to the obtained results JC score in studied population was high. Also, the results showed that prevalence of the MSDs among nurses was very high. This situation can lead to physical fatigue, emotional exhaustion and burnout as well as job absenteeism and change finally. Physical strain control and psychosocial factors should be prioritized to reduce physical and mental job stress.

Also educational and training courses about stress management, proper communication, body mechanics, risk factors and coping strategies in the workplace is recommended. Despite high workload stress management plan will create high job satisfaction organizational commitment and patient safety in health care sectors.

ABBREVIATIONS

- (NIOSH): National Institute for Occupational Safety and Health
- (MSDs): Musculoskeletal Disorders
- (WMSDs): Work-related Musculoskeletal Disorders
- (JC): Job Content
- (BM): Body Map
- (LB): Low Back
- (ANOVA): Analysis of Variance
- (SD): Standard Deviation
- (VDTs): Video Display Terminals

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