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The prevalence of musculoskeletal disorders among undergraduates and technicians of operating room of the educational hospitals affiliated with Iran University of Medical Sciences in 2016

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ABSTRACT

Background & Aim: Musculoskeletal diseases are accounted for a major part of occupational diseases, which threaten the health and performance of medical staff, especially operating room nurses. Considering the importance of this matter, the aim of the present study was to determine the prevalence of musculoskeletal disorders among operating room nurses in educational hospitals affiliated with Iran University of medical Sciences in 2016.

Methods & Materials: The present study was a descriptive analytical study. The samples for the present study were 133 operating room nurses who were selected using census sampling method. Data were gathered using Nordic Musculoskeletal Questionnaire and a researcher-made questionnaire and analyzed using independent t-test, chi square test and SPSS software version 22.

Results: Results showed that the prevalence of musculoskeletal disorders during the past 12 months was 41.4% in the neck, 34.3% in the shoulders, 11.3% in the elbows, 35.3% in the wrists, 42.1% in the back, 61.7% in the waist, 16.5% in the buttocks, 46.6% in the knees and 29.3% in the feet. Results of chi square test showed a significant relation between the field of surgery and the prevalence of musculoskeletal disorders ($p = 0.047$). Independent t-test revealed a significant relation between the working history and occurrence of musculoskeletal disorders ($p = 0.002$).

Conclusion: Results revealed the high prevalence of musculoskeletal disorders among operating room nurses and so, it is recommended to provide educational courses for teaching the principles of ergonomics and correct method of standing and also, Regulations for decreasing the working hours of the personnel.

Introduction

Musculoskeletal disorders, around the world, are the main cause for occurrence of different degrees of disability, long-term diseases, imposed treatment costs and leaving the work at different organizations (1). Musculoskeletal disorders are considered as one of the most prevalent and expensive occupational damages, because they account for one third of occupational diseases annually, lead to loss of working ability in 600 thousands personnel in a year and spending costs equal to 45 to 54 billion dollars and consequently, decreased working efficiency (2). Currently, pains caused by musculoskeletal disorders are increasing among all age groups. Although, nowadays, musculoskeletal disorders are known as a global problem and an important occupational disease, most of the studies in this field have been conducted on occupational groups such as computer users and administrative staff and these disorders have not been evaluated among other occupational groups at risk. However,

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medical staffs are at high risk for musculoskeletal disorders and among the medical professions, nurses are more prone to musculoskeletal disorders due to the special condition of their work; the present study has evaluated operating room nurses (3-5). Currently nursing profession has the second rank in performing special physical activities and also causing musculoskeletal damages.(6) In the study of Chung et al the prevalence of musculoskeletal damages among nurses was 67.42%, which was higher than its rate among non-nurses with a prevalence of 56.96% (7). It could be said that musculoskeletal disorders are the most common causes for not receiving the salary, occurrence of long-term diseases and occupational disorders in developed and developing countries. On the other hand, musculoskeletal disorders might lead to shortage of staff, which is one of the greatest global challenges in the field of nursing profession. After respiratory problems, musculoskeletal disorders are the second cause of missing work due to short-term diseases (less than two weeks). Also these disorders are the main cause of missing work for more than two weeks in Norway (8). Occupation-related musculoskeletal disorders are a serious socioeconomic problem and its prevalence is high among medical staff due to risky occupational positions such as remaining in inappropriate positions, hand works and high stress (9). From all the musculoskeletal disorders, back pain is the most prevalent among nurses in a way that studies have shown that 18% of nurses have quitted their work due to back pain and started looking for other occupational opportunities; however their chances are low due to having back pain. Also back pain is accounted for three-quarters of the one million days of missing work by nurses in a year (10). The annual prevalence of back pain among German nurses is 67 to 73% and among nurses of Hong Kong is 38.9%. Regarding musculoskeletal disorders in other parts of the body, a study that was conducted on nurses in Netherlands revealed that the prevalence of back disorders was 63% and neck disorders was 30%. Another study that was conducted in Ghazvin, Iran, reported the prevalence of musculoskeletal disorders among operating room nurses as follow: neck was 13.7%, shoulder pain 53.7%, elbow pain 37.1%, wrist pain 59.3%, back pain 72.2%, buttocks pain 70.4%, thigh pain 38.9%, knee pain 59.3% and ankles pain 37.1%. In The mentioned study, the most important reasons for occurrence of musculoskeletal disorders were being female and long working hours per week (11). The study of Moazzami et al that was conducted on the prevalence of musculoskeletal disorders in upper limbs of nurses reported that 43% to 53% of nurses had shoulders problems and 31% to 48% of them suffered from neck damages (10). Most of the studies have investigated musculoskeletal disorders among nurses of general hospitals and occupational disorders among other important groups such as operating room nurses have less been assessed. Although, annually, 30 to 60% of the nurses would suffer from musculoskeletal disorders in different parts of their bodies, operating room nurses are more prone to musculoskeletal disorders due to performing repeated activities, remaining in constant physical positions for a long time, stretching out and holding surgical instruments and lifting heavy stuff (12, 13). The operating room as the environment for performing therapeutic surgeries on patients is of greater importance that other medical places. The nature of surgery would impose a great working pressure on the operating room nurses. Also the complexity of the surgery environment is associated with various dangers and risks including physical, psychological, biological and chemical risk

factors (9). About related factors to the prevalence of musculoskeletal disorders, Habibzadeh et al mentioned demographic characteristics (age, gender, weight, height, smoking, exercising and marital status) and psychological factors as the important factors in occurrence of musculoskeletal disorders (14). Since one of the most important resources of any organization is its human resources and one of the most important reasons for early retirement in medical staff is musculoskeletal disorders, and also considering that these disorders are mostly preventable, recognition and accurate evaluation of these disorders is the first step toward preventing and controlling early retirement due to these disorders (11). A qualitative report of the prevalence of pain, damage and disability and perception of potential factors for health is necessary for understanding how musculoskeletal disorders and its related factors could affect operating room personnel, especially the nurses (15) Considering the destructive effects and significant prevalence of musculoskeletal disorders, it seems necessary to conduct more researches in this field and especially on the operating room nurses to determine the related factors to occurrence of musculoskeletal disorders and provide strategies for decreasing them. Therefore, the present study was conducted to determine the prevalence of musculoskeletal disorders and its related factors among operating room nurses of the educational hospitals affiliated with Iran University of Medical Sciences in 2016.

Methods

The present study was approved with ethic code of IR.IUMS.REC 1395.9411101010 and conducted using descriptive-analytical methodology. Studied samples were 133 operating room nurses of the educational hospitals affiliated with Iran University of Medical Sciences who were selected using census sampling method. The inclusion criteria were being employed, having a bachelor's degree or associate's degree of operating room nursing, and willingness to participate in the study. The exclusion criteria were having congenital musculoskeletal problems or musculoskeletal injuries.

Data were gathered using Nordic Musculoskeletal Questionnaire and a researcher-made questionnaire. Nordic Musculoskeletal Questionnaire evaluates the prevalence of musculoskeletal disorders in nine parts of the body (neck, back, hands, shoulders, ankles, wrists, elbows, one or both hips (flanks) and thighs). A score of one is assigned to parts with musculoskeletal disorders and a score of zero for parts with no disorder. Nordic questionnaire has been validated in previous Iranian studies and its reliability has been approved with a Cronbach's α of %83 (16).

The researcher-made questionnaire had 8 items including educational level, marital status, exercise program, daily working hours, working experience, field of surgery, and body mass index (BMI). Face and content validity of the researcher-made questionnaire were approved by taking the opinion of 10 academic members of Iran University of Medical Sciences. In terms of ethical considerations, all of the participants were ensured that their names and information will remain confidential and results will be reported anonymously. Data were analyzed used Chi square and independent t tests. The significant level for all the statistical tests was consider at <0.05.

Results

Demographic characteristics of the participants are shown in table 1. According to table 1, the mean age of the participants was about 29 years old and the minimum

and maximum ages were respectively 22 and 60 years. Also the mean of body mass index was about 23 kg/m2 and the mean of participants' working experience was 5 years. The minimum and maximum of working experience were respectively 1 and 38 years.

The participants of this were working for about 10 hours per day and minimum and maximum working hours per day were respectively 5 and 14 hours.

77.4% of the participants were male and 22.6% were female. 50.4% were single and 49.6% were married. Also 17.3% of them had an associate's degree while 82.7% had a bachelor's degree. Studying the exercise program of the participants revealed that 18.8% of them had regular exercise program while 81.2% did not have a regular exercise. As it is shown in table 1, 55% of the participants were working in the field of general surgery, 28% in the field of orthopedic surgery, 12.8% in the field of neurosurgery, and 4.2% in the field of gynecological surgery.

Table 1. Demographic characteristics of the sample participating in the study

Variable		Minimum	Maximum	Mean	SD
Age (years)		22	60	29.13	6.8
BMI (kg/m^2)		17.7	34.5	23.06	2.7
Working experience (years)		1	38	5.84	6
Daily working hours		5	14	10.61	2.2
		Frequency		**Percent**	
Gender	Male	30		22.6	
	Female	103		77.4	
Marital status	Single	67		50.4	
	Married	66		49.6	
Educational level	Associate's degree	23		17.3	
	Bachelor's degree	110		82.7	
Regular exercise	Yes	25		18.8	
program	No	108		81.2	
Field of Surgery	General	73		55	
	Orthopedic	28		28	
	Neurosurgery	17		12.8	
	Gynecological	6		4.2	

The prevalence of musculoskeletal disorders in different parts of the body is shown in diagram1. As it can be observed, the prevalence of musculoskeletal disorders during the past 12 months in the neck was 41.4%, in the shoulders was 34.3%, in the elbows was 11.3%, in the wrists was 35.3%, in the back was 42.1%, in the waist was 61.7%, in the knees was 46.6%, and in the feet was 29.3%. The highest rate of disorder belonged to the waist (61.7%) and the lowest rate of disorder belonged to elbows (11.3%).

To evaluate the relation between demographic characteristics and the prevalence of musculoskeletal disorders during the past 12 months, chi square and independent t tests were used and the results are presented in table 2. As it is shown in table 2, independent t test showed a significant relation between the prevalence of musculoskeletal disorders and working experience ($p = 0.002$); while relation between the prevalence of musculoskeletal disorders and age, BMI, and daily working hours was not statistically significant.

Also results of chi square test revealed a significant relation between the prevalence of musculoskeletal disorders and the field of surgery ($p=0.047$), but the relation of musculoskeletal disorders with gender, marital status, educational level and regular exercise program was not statistically significant.

Figure 1. Prevalence of musculoskeletal disorders in different parts of the body during the past 12 months

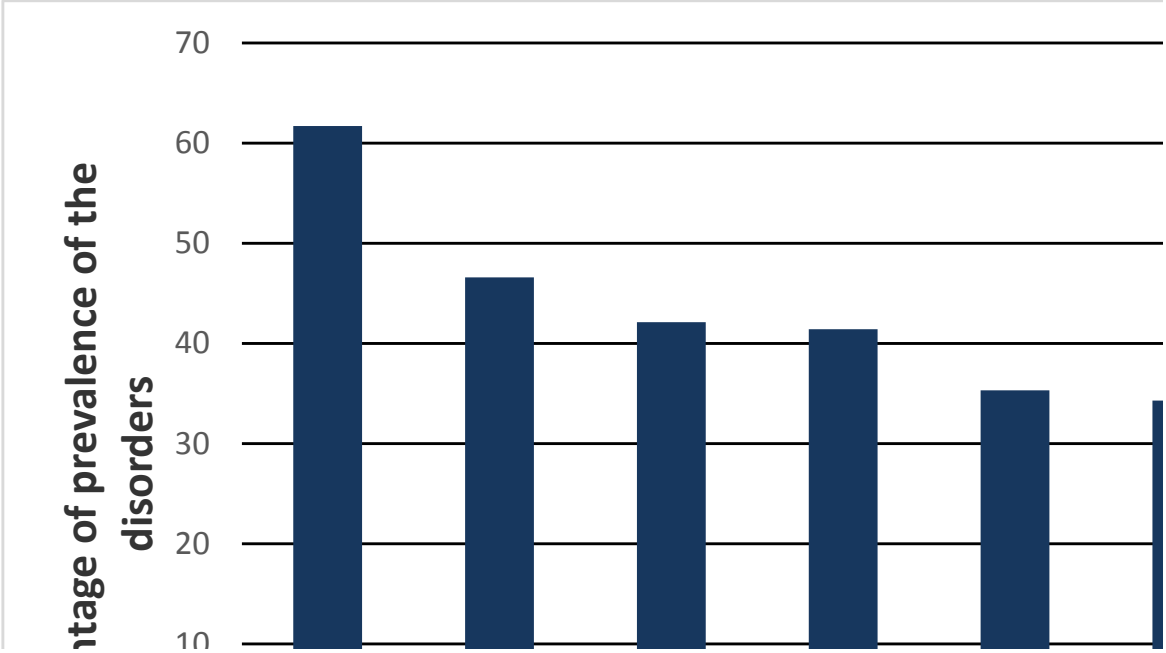

Table 2. The relation between demographic characteristics and the prevalence of musculoskeletal disorders during the past 12 months

Variable		**Musculoskeletal disorders**		**Test**
		Mean (SD)	**Mean (SD)**	**Independent t test**
Age (years)		28.9 (± 6)	30.5 (± 10.8)	0.95
BMI (kg/m^2)		23.1 (± 2.7)	22.6 (± 2.5)	0.63
Working experience (years)		5.75 (± 5.69)	6.38 (± 7.89)	0.002
Daily working hours		10.56 (± 2.2)	10.94 (± 2)	0.05
Variable		**Yes / N (%)**	**No / N (%)**	**Chi square test**
Gender	Male	26 (86.7)	4 (13.3)	0.97
	Female	89 (86.4)	14 (13.6)	
Marital status	Single	60 (89.6)	7 (10.4)	0.29
	Married	55 (83.3)	11 (16.7)	
Educational level	Associate's degree	18 (81.8)	4 (18.2)	0.63
	Bachelor's degree	96 (87.3)	14 (12.7)	
Regular exercise program	Yes	20 (80)	5 (20)	0.29
	No	95 (88)	13 (12)	
Field of surgery	General	60 (82.2)	13 (17.8)	0.047
	Orthopedic	27 (96.4)	1 (3.6)	
	Neurosurgery	15 (88.2)	2 (11.8)	
	Gynecological	5 (83.3)	1 (16.7)	

Discussion

The results of the present study showed that the prevalence of musculoskeletal disorders during the past 12 months was 41.4%, 34.3%, 11.3%, 35.3%, 42.1%, 61.7%, 16.5%, 46.6% and 29.3% in the neck, shoulders, elbows, wrists, back, waist, buttock, knees and feet respectively. In the present study, waist pain was the most prevalent musculoskeletal disorder and this result was in line with the results of Mahdipoor et al (2012), Raeisi et al (2011), Faraz et al (2014), Arabian et al (2013), Azizpoor et al (2012), Arsalani et al (2014), Khosroabadi et al (2007), Taghinejad et al (2014), Choubineh et al (2010), Homaid (2016), and Abolata (2016) (6, 8, 11, 13,26, 16-21) The results did not confirm the results of Bahrami (2006) who was conducted on operating room nurses and the prevalence of musculoskeletal disorder was the highest in the back and the elbows (22). Also, Sezto reported that the highest rate of musculoskeletal disorders among operating room nurses belonged to the neck (2009). The study of Nutzi (2005), unlike the present study, has mentioned that neck and elbows were the most involved sites in musculoskeletal disorders (12, 23). On the other hand, results of the present study showed no statistically significant relation between the prevalence of musculoskeletal disorders and gender, educational level, marital status and BMI, which is unlike the results of Mahdipoor et al (2012), Onishy et al (2013), and Raeisi et al (2011). All of these studies reported that being female was a related factor to the prevalence of musculoskeletal disorders (8, 9, 17) Also Faraz et al (2014 believed that weight was an effective factor in occurrence of musculoskeletal disorders, which was not similar to the present study (11). Results of the preset study showed no statistically significant between the prevalence of musculoskeletal disorders and having regular exercise programs. However Moscato et al (2016) mentioned the direct effect of exercising in decreasing musculoskeletal disorder (24), Which was not similar to the results of the present study.

Results revealed a significant relation between the prevalence of musculoskeletal disorders and working experience; Raeisi et al (2011), Homaid (2016), Moscato (2010), Ali Abadi et al (2010), Habibzadeh (2006) and Mahdipoor et al (2012) also mentioned working experience as an effective factor in occurrence of these disorders which is similar to the present study (8, 14, 17, 20, 21, 25). Evaluating the prevalence of musculoskeletal disorders based on age indicated that musculoskeletal disorders were more prevalent among the age group of 35 to 39 year old (all of them). In the study of Bahrami et al (2006) no significant difference was observed between different age groups regarding the prevalence of musculoskeletal disorders, which is not in line with the results of the present study (22). On the other hand, Habibzadeh et al (2007) and Onishy et al (2013) have emphasized on the effects of aging on the prevalence of musculoskeletal disorders which confirms the results of the present study (9, 14).

Based on the results of the present study, operating room nurses, for tolerating great work pressure caused by long surgeries, are at least suffering from one musculoskeletal problem. This would affect their professional and personal life. Considering the close relationship of operating room nurses with patients, decreased efficiency of these nurses would directly affect the quality of provided services and weaken the treatment process. Also occurrence of musculoskeletal disorders would impose extra costs on the personnel, patients and even the medical center while these costs

could be prevented by allocating a small budget for educating the personnel. Results of the present study could be used in future studies with similar subjects. Also these results are a documented report on the prevalence of musculoskeletal disorders among operating room personnel.

One of the limitations of the present study was that participants were working while answering the questionnaires and could not completely focus on their answers and also they would become tired of answering the questions.

Considering all the mentioned factors, measures such as informing and educating the correct method of standing and using the correct ergonomic principles, the correct manner of transferring the operating room equipment and decreasing personnel's working hours as much as possible should be regarded for operating room nurses.

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Conflict of Interest

The authors of this study declare no conflicts of interest.

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