Original article

Comparative Study on Musculoskeletal Disorders in Male and Female Personnel of Operating Room of Mazandaran University of Medical Sciences' Educational Therapeutic Centers In 2018

Ali Pahnabi 1, Fatemeh Zahra Bagheri 1, Ail Morad Heidari Gorji 2*

1. Student Research Committee, Department of Operating Room, Mazandran University of Medical Sciences, Sari, Iran.
2. Medical Education, DC Department, Mazandaran University of Medical Sciences, Sari, Iran.

*Corresponding Author: **Ail Morad Heidari Gorji**, Medical Education, DC Department, Mazandaran University of Medical Sciences, Sari, Iran. Email: alifar_2004@yahoo.com

Abstract:

Introduction: Musculoskeletal disorders are one of the most prevalent factors of occupational damages and disabilities in industrialized and developing countries. The aim of this study was to evaluate the ergonomic risk of musculoskeletal disorders in male and female operating rooms personnel of Mazandaran University of medical sciences' educational therapeutic centers in 2018.

Method: In this study, 97 male and female surgical technologists of Mazandaran University of medical sciences' educational therapeutic centers (31% male and 69% female) were studied. In this study, part of the data was collected by demographic and Nordic questionnaires and another part by assessing occupational posture using REBA method.

Findings: The highest prevalence of disorders was in the back (71.16%), lumbar (67.01%), knees (61.85%); and the lowest prevalence was in the buttock (15.46%), leg and ankle (18.55%). There was a significant relationship between age, weight, work experience and exercise during a week and the prevalence of musculoskeletal disorders. 26.8% of the employees were at low risk, 52.5% were at moderate risk and 20.6% were at high risk. There was no significant relationship ($p<0.05$) between risk and musculoskeletal disorders, but by increasing the risk of affliction, the prevalence of these complications also increases.

Conclusion: Generally, the prevalence of musculoskeletal disorders among the operating room employees is high and individuals are encountered with so many risk factors such as stable inappropriate postures like bending for a long time, standing too long, moving and transferring the patient and inadequate rest and intensive job shifts and etc, which corrective measures should be provided in order to ameliorate the occupational situations for personnel.

Key words: Muscular Disorders, Skeletal Disorders, Operating Room Personnel,

Introduction:

Musculoskeletal disorders refer to any kind of muscular, skeletal and nervous systems damages which disturbed these organisms function (1). These disorders are commonly painful in different regions of the body such as neck, shoulders, elbow, wrist, waist, and throat and also induce organic lesions in some regions and organs (2). The world health organization considers musculoskeletal disorders as muscles tendons, peripheral nerves, ligaments, joints, cartilage and spine disorders which have not been occurred accidentally and not acute, but chronic and gradual (3, 4). The incidence of musculoskeletal disorder depends on many factors such as age, sex, personal sensitivity, working hours in a day, psychological stress, job satisfaction, physical fitness and etc (5). Musculoskeletal disorders are one of the most prevalent factors of occupational damages and disabilities in industrialized and developing countries (6). The mortality caused by job is about 1.5% of the worlds' annual mortalities which in developing countries is about 40% higher than reported percentage in advanced countries (7). These disorders are the most prevalent problems of health care centers (1). These discomforts include the $\frac{1}{3}$ of the occupational diseases (8). Over the past 15 years musculoskeletal problems have been increased and are one of the reasons of employees' occupational disabilities and impose on government a lot of economic costs (9). This disease is ranked second after occupational respiratory diseases the studies have been represented that among the musculoskeletal disorders, backache is in the first level (10). Now in order to control the risk, it is important to realize how these disorders are created and appearing in the society (11), so that many of these disorders can be prevented by changing the materials, equipments or the procedure (12). Symptoms of these disorders include a set of discomforts, pains, pins and needles, inflammation, touch sensitivity, the motion limitation, loss of strength and ability, and sensory disorders in different parts of the body (13). The solution in this study is training the operating room employees and comparison the degree of the disease between men and women in order to determine the risk factors and inform and educate the employees to reduce this rate. In the study of Paul Masjenderholland, three month prevalence of musculoskeletal disorders among healthcare employees was higher than the ordinary people in the society which was comparable with the prevalence of stressful occupations, industry and constructions. The health sector is the largest sector in terms of female recruitment, which includes 75% of the total employees (14). In most of the studies, the rate of musculoskeletal disorder in women was higher than men (15, 16), therefore the purpose of this study was to compare musculoskeletal disorders between male and female personnel of Mazandaran university of medical sciences' operating rooms in 2018. It is hoped that this comparison will be a step towards reducing the amount of musculoskeletal disorder and thereby reducing the costs and other problems.

Methods:

In this descriptive cross-sectional study that conducted in Mazandaran university of

medical sciences in order to compare the musculoskeletal disorders between male and female personnel in the operating room of educational therapeutic centers in 2018. The population studied was the personnel in operating room of Mazandaran University of medical sciences' educational therapeutic centers which was 125 people that 97 of them were selected randomly. The research tool was a questionnaire. The structure of the questionnaire was that it could be completed in two ways: one was through interviewing with personnel and the other was answered by individuals. This questionnaire was composed of two sections: A) general questionnaire, B) specific questionnaire, the purpose of the general questionnaire was the overall study and the disorders symptoms of the whole body are considered. While the specific questionnaire deals with the further analysis of these symptoms in a particular region pf the body, such as waist, neck and shoulders. Generally, there were two aims in designing these questionnaires: A) as a mean of screening musculoskeletal disorders, B) for occupational health services. These questionnaires can be used for measuring the results of epidemiological studies in the field of musculoskeletal disorders, but they cannot be used for clinical diagnosis. Screening the musculoskeletal disorders is usable as a diagnostic tool to revision the work place, work station and tool design. For instance, there is a relationship between affliction of musculoskeletal disorders and disproportion between responsibilities or tools and users. For occupational health services, this questionnaire can be used in several purposes. Diagnosis of occupational stress and the effect of work environment improvement are examples in this area. A public questionnaire has been designed to answer general question of whether musculoskeletal disorders arise for a particular population, and if so, these disorders are concentrated in which part of the body. By considering this issue, a questionnaire has been designed, which has divided human's body into 9 anatomical regions .These anatomical regions has been selected according to two criteria :A) the organs in which the symptoms are concentrated. B) The organs that can be distinguished by both investigator and respondent .Oral questions are asked about each body anatomical region and it is asked people to answer if they have any discomfort or problem during the last 12 months in these regions and if these problems have caused them abandon their job or any disability to work. The general limitations of questionnaire methods are applied to the Nordic standardized questionnaires .From epidemiological aspects; this type of questionnaire is more useable for cross-sectional studies. This standard questionnaire has been widely used in Denmark, Finland, Norway and Sweden and also in more than 100 different projects such as current activities of occupational health services. Generally speaking, this questionnaire provides useful and reliable information about the symptoms of musculoskeletal disorders which can be used for further studies or deciding about corrective actions. The questionnaires were distributed by the researcher .After collecting data these data were analyzed by SPSS16 software and use of descriptive statistic such as mean and

standard deviation and independent T statistical test and analysis of data variance.

Findings:

In table 1, mean and standard deviation of the demographic and occupational features are reported. In table 2, the prevalence of musculoskeletal disorders in different part of male and female personal's body of Mazandaran medical science university's educational therapeutic centers' operating rooms in 1395 is reported. The most prevalent disorders among these people are back (71.16%), waist (67.01%), knee (61.85%) respectively and the least prevalent disorders are buttock (15.46%) and leg and ankle (18.55%) respectively. The relationship between variables individual and occupational and the prevalence of musculoskeletal disorders (at least in one of the 9 regions of the musculoskeletal system) is represented in table 3. We used the nonparametric Mann-Whitney test in order to evaluate the relationship between age, weight, height, amount of exercise per week and work experience and the prevalence of musculoskeletal disorders. By determining relationship between variable " age" and musculoskeletal disorders , as the p-value is 0.01 and less than 0.05 ,it can be concluded that there is significant relationship between variable age and the prevalence of musculoskeletal disorders .mean of the variable age of people afflicted musculoskeletal disorders is more than those who they have not been afflicted these disorders .by determining relationship between the variable "height" and musculoskeletal disorders , as the p-value is 0.2 and more than 0.05 , it can be concluded that there is not significant relationship with variable height and musculoskeletal disorders and the mean of the variable height of people afflicted musculoskeletal disorders was equal to those who they have not been afflicted these disorders . By determining relationship between variable " weight" and musculoskeletal disorders , as the p-value is 0.00 and less than 0.05 , it can be concluded that there is significant relationship between variable weight and the prevalence of musculoskeletal disorders .mean of the variable weight of people afflicted musculoskeletal disorders is more than those who they have not been afflicted these disorders. By determining relationship between variable " exercise amount per week " and musculoskeletal disorders , as the p-value is 0.001 and less than 0.05 ,it can be concluded that there is significant relationship between variable exercise amount per week and the prevalence of musculoskeletal disorders .mean of the variable exercise amount per week of people afflicted musculoskeletal disorders is more than those who they have not been afflicted these disorders . By determining relationship between variable "work experience " and musculoskeletal disorders , as the p-value is 0.001 and less than 0.05 ,it can be concluded that there is significant relationship between variable work experience and the prevalence of musculoskeletal disorders .mean of the variable work experience of people afflicted musculoskeletal disorders is more than those who they have not been afflicted these disorders .by determining relationship between variable gender and musculoskeletal disorders , we used the Nonparametric chi square test. As the p-value is 0.00 and less

than 0.05, it can be concluded that there is significant relationship between variable gender and prevalence personal's musculoskeletal disorders. The results of the risk assessment of prevalence of musculoskeletal disorders in people studied by REBA method are represented in table three. According to table 4, we realize that 26.8% of employees are with low risk, 52.5% are with moderate risk and 20.6% of them are with high risk.To determine the frequency distribution of people with or without musculoskeletal disorders, we utilized KAY SQUARE test in different levels of musculoskeletal disorders' risk. According to P-VALUE which equals to 0.3 and is less than 0.05, we notice that there isn't any significant relationship between risk level and musculoskeletal disorders, but the high risk level of affliction increases the prevalence of these complications.

Conclusion:

Generally, the society with mean of 35.87 years and work experience of 14.67 years is almost a young society. The findings of current study represent that the educational-therapeutic centers of Mazandaran's surgical technologists' prevalence of musculoskeletal disorders in 1395 was approximately high as 61.21% of studied people has been afflicted by musculoskeletal disorders at least in one of 9 anatomical regions over the past 12 months.

The highest prevalence of disorders in these cases are back 71.16%, waist 67.01% and knee 61.85% respectively; and the lowest prevalence of disorders are buttock and thigh 15.46% and leg and ankle 18.55% respectively, which consistent with Ozgoli and his colleagues (17). The prevalence of these disorders in these regions can be related to their inappropriate occupational situation such as bending for a long time, helping the patient during the surgery, staying stooped position and helping in transferring the patient (18, 19); also other results of this study represent that there is a significant relationship between age, weight, work experience and exercise hours in a week and prevalence of musculoskeletal disorders for male and female operating room personnel of Mazandaran educational therapeutic university's centers in 2018.

People who have been afflicted by these disorders have higher mean of age, weight and work experience, than people who haven't reported any kinds of symptoms. By getting old, people become weaker physically and the occupational situations expose them to further damages. Also weight gain can be a factor in occurrence of musculoskeletal pain especially in the waist and legs. This finding consistent with results of researches which proved getting old, gaining weight and work experience relate to musculoskeletal disorders' prevalence(17, 20). Significant relationship between age and disorders' prevalence in this study is consistent with Ozgoli and colleagues' research (17), Bahrami (21) and Ijzelenberg (22).

26.8% of employees are with low risk, 52.5% are with moderate risk and 26.6% are with high risk, which indicates that ergonomic corrective measures are essential among employees. Also findings of this study determine there is not a significant

relationship between risk level and musculoskeletal disorders but by increasing risk of affliction, prevalence of these complications also increase. This finding consistent with Choobineh and colleagues' research (23), Zare and colleagues (24).

Generally we realize that musculoskeletal disorders' prevalence from job for operating room employees is high and individuals are encounter with so many risk factors such as inappropriate stable posture, like bending for a long time, standing too long, transferring the patient, inadequate rest and intensive job shifts and etc, which corrective measures should be provided in order to ameliorate the occupational situations for personnel.

Correct aid training for patient, designing operating rooms' beds in accordance with ergonomic standards, using job rotation, having enough and adequate rest, also preparing an area enhanced with sport equipment and teaching corrective exercise in a specific time of day for hospital's personnel by utilizing professional coaches, can be useful for decreasing the musculoskeletal pain.

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Tables and Figures:

Table1: Demographic and occupational of people studied

Variable	Mean and standard deviation
Age	35.87 ± 6.5
Weight	65.49 ± 7.11
Height	164.8 ± 8.5
Work experience	14.62 ± 4.54
Exercise hours among a week	2.63 ± 2.42

Table2: The prevalence of musculoskeletal disorders in different body's regions of people studied (n: 97 people)

Body organs	Number	Frequency (percentage)
Neck	54	55.67%
Shoulder	48	49.48%
Elbow	30	30.92%
Wrist and Hand	57	58.76%
Back	70	72.16%
Waist	65	67.01%
Buttock	15	15.46%
Knee	60	61.85%
Leg and Ankle	18	18.55%

Table 3: Comparison of individual and occupational features of people with/without musculoskeletal disorders in different regions of people studied bodies

variable		With musculoskeletal disorders	Without musculoskeletal disorders	Lowest highest	p-value
Age	Mean and standard	37.48 ± 3.9	31.44 ± 2.6	54-23	0.01
Height		165.28 ± 9.36	163.64 ± 8.71	180-147	0.2
Weight		66.71 ± 6.78	61.87 ± 5.11	90-45	0.00
Exercise amount per a week		1.42 ± 1.2	3.23 ± 1.73	10-0	0.001
Work experience		15.61 ± 3.4	10.23 ± 2.71	29-1	0.001
Gender	Female	62.5%	61%		0.00
	Male	37.5%	39%		

Table 4: Results of risk level assessment by REBA method on people studied (97 persons)

Risk level	Number	Percentage
Deniable	-	-
Low	26	26.8
Moderate	51	52.5
High	20	20.6
Extremely high	-	-
Total	97	100

Table5: represents frequency distribution of people with or without musculoskeletal disorders in different levels of musculoskeletal disorder affliction risk

Risk level	Has risk	Percentage	No risk	Percentage	p-value
Deniable and low	22	35.48	12	34.28	0.3
Moderate and high	40	64.51	23	65.71	

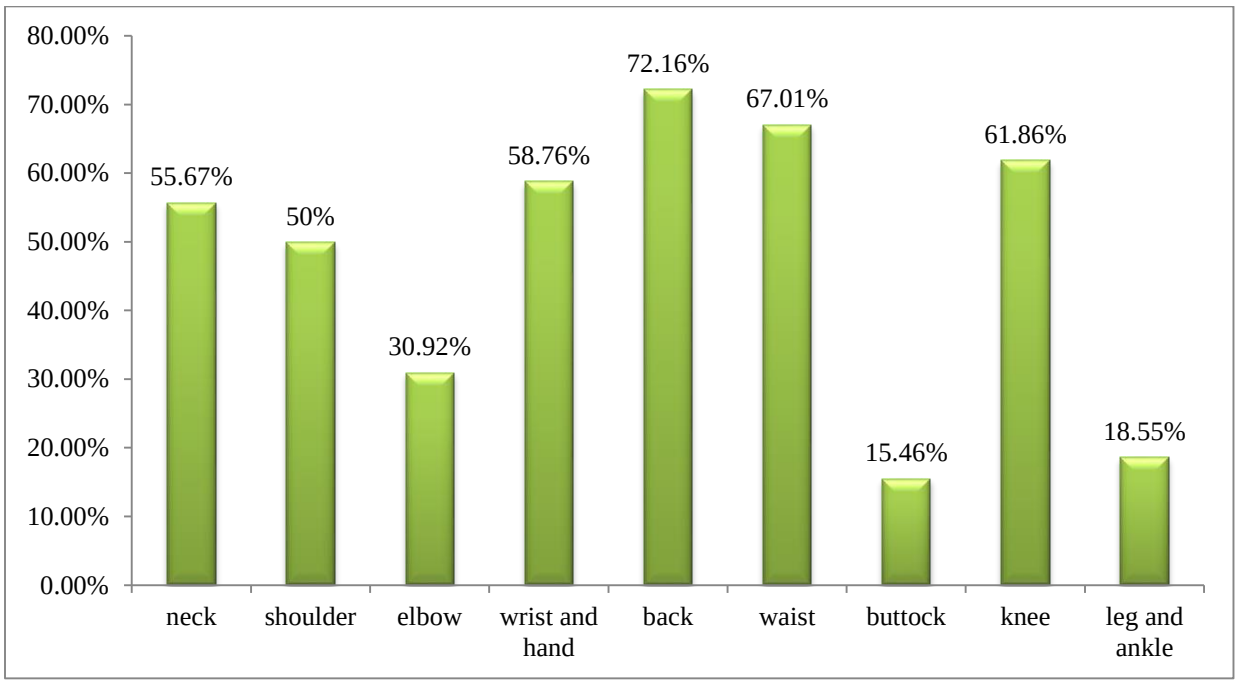

Figure 1: The prevalence of musculoskeletal disorders in different body's regions of people studied