

Research Article

Musculoskeletal Disorders and Relationship with Physical Activity in Office Workers

Ofis Çalışanlarında Kas-İskelet Rahatsızlıkları ve Fiziksel Aktivite ile İlişkisi

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ABSTRACT

Purpose: The aim of this study is to investigate the relationship between musculoskeletal disorders and physical activity levels in office workers. **Material and Methods:** Extended Nordic Musculoskeletal System Questionnaire and the International Physical Activity Questionnaire Short Form were used. **Results:** A total of 107 people participated in the study. The results were as follows: gender being female increased the risk of shoulder pain 4.7 times. Working without a break for 4 hours or more increased the risk of pain in the neck by 5.6 times and the risk of pain in the shoulder by 5.2 times. Not doing enough physical activity increased the risk of neck pain 2.9 times, the risk of shoulder pain 5.6 times, and the risk of back pain 3.0 times. **Discussion:** Physical activity level and musculoskeletal disorders were found to be related. In future studies, the relationship between which level of physical activity and which musculoskeletal disorder can be investigated.

Keywords: Healthcare workers; Musculoskeletal diseases; Physical activity.

ÖZ

Amaç: Bu çalışmanın amacı, ofis çalışanlarında görülen kas-iskelet sistemi rahatsızlıkları ile fiziksel aktivite düzeyi arasındaki ilişkiyi araştırmaktır. **Gereç ve Yöntem:** Genişletilmiş Nordik Kas-iskelet Sistemi Anketi ve Uluslararası Fiziksel Aktivite Anketi Kısa Formu kullanılmıştır. **Sonuçlar:** Çalışmaya 107 kişi katıldı. Sonuçlar şöyledi: Cinsiyetin kadın olması omuz ağrısı riskini 4,7 kat artırdı. 4 saat ve daha fazla ara vermeden çalışmak boyun ağrısı riskini 5,6 kat, omuz ağrısı riskini 5,2 kat artırdı. Yeterli fiziksel aktivite yapmamak boyun ağrısı riskini 2,9 kat, omuz ağrısı riskini 5,6 kat ve sırt ağrısı riskini 3,0 kat artırdı. **Tartışma:** Fiziksel aktivite düzeyi ile kas-iskelet sistemi rahatsızlıkları ilişkili bulundu. İleride yapılacak çalışmalarda hangi fiziksel aktivite düzeyi ile hangi kas-iskelet sistemi bozukluğu arasında ilişki olduğu araştırılabilir.

Anahtar Kelimeler: Kas-iskelet sistemi hastalıkları; Fiziksel aktivite; Sağlık çalışanları.

With the development of technology all over the world, the use of computers in workplaces is gradually increasing. While entering the workplace increases productivity, causing changes in work organizations and the development of new risk factors, primarily musculoskeletal diseases, bring many health problems (Javazi, Sedaghati and Daneshmandi, 2019).

The most important factors in the occurrence of musculoskeletal disorders in computer users consist of using a keyboard, posture in a static position, using the body in the wrong positions and inadequate ergonomic conditions in the workplace. It has been reported that musculoskeletal disorders reduce the efficiency of work and cause people to stop working (Heuvel, IJmker, Blatter et al., 2007; Mohammadipour, Pourranjbar, Naderi et al., 2018).

Numerous studies have reported that computer users are exposed to musculoskeletal disorders and psychological stress, and the presence of musculoskeletal system disorders, especially in the upper body (back, upper body), neck, waist and hand during the performance of professional functions (Eltayeb, Staal, Hassan et al., 2008; Cho, Hwang and Cherng, 2012; Bagheri and GHalajahi, 2019). Office workers often work with computers and sit for long hours. Previous research has reported that office workers spend about 10.6 hours a day sitting and that prolonged sitting at the workplace is associated with serious health problems (Smith et al., 2015; Putsa et al., 2022). Dzakpasu et al. (2021) showed evidence supporting significant associations between workplace sitting time and MSD among office workers.

Although there are many studies on the relationship between physical, personal and psychosocial risk factors and musculoskeletal diseases, there is limited information about physical activity as a factor in preventing musculoskeletal diseases. There is evidence that regular physical activity is effective in preventing many chronic diseases and early deaths such as cardiovascular diseases, diabetes, cancer, osteoporosis, hypertension, obesity and depression (O'Donovan, Blazevich, Boreham et al., 2010). Physical inactivity is also associated with increased rest, obesity and increased mortality, such as chronic musculoskeletal disorders (Holth, Werpen, Zwart et al., 2008).

Among the existing studies, it has been observed that there is no study examining the

relationship between musculoskeletal disorders and physical activity in individuals working in an office environment. Since healthcare professionals do not only work in a hospital environment, healthcare professionals who work in an office environment and stay in front of a computer for a long time were included in this study. Understanding how the physical activity level of individuals who have to sit for a long time has an effect on the health of the musculoskeletal system will make an important contribution to the literature. The aim of this study is to investigate the relationship between musculoskeletal disorders seen in office workers and physical activity levels. Among the original aspects of the study are the inclusion of health professionals working outside the hospital, the evaluation of the level of physical activity in individuals who have to work by sitting for a long time, and the examination of the relationship between physical activity level and musculoskeletal system disorders.

MATERIAL AND METHODS

Participants

All employees of a district health directorate were included in this cross-sectional study. It was aimed to reach all of these people, who mainly work in the office environment, and the sample was not selected. Persons with any musculoskeletal disease were excluded from the study. Other than that, there were no exclusion criteria. 14 people with any musculoskeletal disease and 4 people who refused to participate in the study were excluded from the study. In addition, 9 people who were assigned to another institution or on leave during the data collection period were not included in the study. The remaining 107 were the study participants. These people, who are carrying out administrative procedures in the district health directorate, were evaluated in terms of physical activity level and musculoskeletal disorders. Questionnaires were administered by the researcher by face-to-face interview method.

The data of the study were collected in a district health directorate in Adana between 01.08.2019 and 01.10.2019. Written informed consent was obtained from the participants before data were collected. The questionnaire included demographic data such as age, gender, education level, and smoking as well as questions such as working time and computer usage time. In a study on long-term computer use, using more than 4 hours of computer per day reported a high level of risk for the musculoskeletal system (Hedge, 2003). For this reason, we divided the daily computer usage time into two groups, less than 4 hours, 4 hours and more.

Those with orthopedic and neurological problems that would prevent physical activity and those with congenital musculoskeletal system deformities were excluded. "Extended Nordic Musculoskeletal System Questionnaire (ENMSQ)" was used to question musculoskeletal disorders. ENMSQ provides reliable information about the onset, prevalence and outcome of musculoskeletal system pain in nine body areas (neck, shoulders, back, elbows, wrists/hands, waist, hips/thighs, knees, ankles/feet). It is a questionnaire that can be filled with a personal interview technique. ENMSQ questions yes/no in nine body areas so far, in the past 12 months, in the past four weeks, and on the day of evaluation, whether pain, pain or discomfort. It was developed by Dawson et al (2009). The Turkish validity and reliability study was conducted by Kahraman, Genc, and Goz (2016).

The International Physical Activity Questionnaire (IPAQ) Short Form developed by Craig et al. was used to determine the level of physical activity (Craig, Marshall, Sjöström et al., 2003). This form can be applied on its own and consists of seven questions including "last seven days" in evaluating the level of physical activity. IPAQ was adapted into Turkish by Saglam and Arikan, and its validity and reliability study was conducted (Saglam, Arikan, Savci et al., 2010).

It provides information about sitting, walking, moderate-intensity activities and time spent in intensive activities. A score is obtained by multiplying the minute, day and MET values. In the calculation, 8 MET values for severe physical activity, 4 MET for moderate-severe activity and 3.3 MET for walking were used. Physical activity levels were classified as physically inactive (<600 MET-min / week), low level of physical activity (600-3000 MET-min / week) and sufficient physical activity level (> 3000 MET-min / week) (Savci, Ozturk, Arikan et al., 2006).

Data analyses

Statistical analysis was done in SPSS (version 16.0, SPSS Inc, Chicago, Illinois, USA) package program. Descriptive statistics are given as mean and standard deviation, while nominal variables are given as numbers of cases and percentages. The chi-square test was used to identify the statistical difference between computer users' musculoskeletal symptoms and possible risk factors. A p-value below 0.05 was considered significant in the 95% confidence interval. In addition, logistic regression analysis was applied.

RESULTS

81 (75.7%) of 107 people who participated in the study were women. 36.4% of the participants were smokers and 72.0% of them were university graduates. When we went to questions about business life, we got the answer that 76.6% had been working at the computer for at least 5 years. 43.9% stated that they worked at the computer for more than 6 hours a day. 44.9% of them worked without a break for 4 hours or more. When we look at physical activity levels, 30.8% were physically inactive, 29.9% were at a low physical activity level and 39.3% were at an adequate physical activity level (Table 1). Body areas that experienced the most pain in the last 1 year were the waist (54.2%), neck (50.5%), back (45.8%) and shoulder (44.9%) (Table 2).

As a result of our analysis, we reevaluated the meaningful results with logistic regression analysis. The results were as follows: gender being female increased the risk of shoulder pain 4.7 times. Working without a break for 4 hours or more increased the risk of pain in the neck by 5.6 times and the risk of pain in the shoulder by 5.2 times. Not doing enough physical activity increased the risk of neck pain 2.9 times, the risk of shoulder pain 5.6 times, and the risk of back pain 3.0 times (Table 3).

Table 1. Distribution of descriptive characteristics of employees

Features		N	%
Gender	Male	26	24.3
	Female	81	75.7
Smoking	Yes	39	36.4
	No	68	63.6
Education level	Middle School	6	5.6
	High school	24	22.4
	University	77	72.0
The year she/he worked at the computer	<5 years	25	23.4
	≥5 years	82	76.6
Hours When Working at A Computer During The Day	<3	15	14.0
	3-6	45	42.1
	>6	47	43.9
Working hours without break	<4	59	55.1
	≥4	48	44.9
Physical activity level	Physically inactive	33	30.8
	Those with low physical activity	32	29.9
	Those with sufficient physical activity	42	39.3
Total		107	100.0
			Mean ± SD
Age			39.49±8.62

SD: Standart Deviation

Table 2. Pain frequency of employees by body regions

Body Regions	Having Pain		
	In the last 1 year N(%)	In the Last 1 Month N(%)	That day N(%)
Shoulder	54 (50.5)	48 (44.9)	26 (24.3)
Back	48 (44.9)	42 (39.3)	23 (21.5)
Elbow	49 (45.8)	46 (43.0)	21 (19.6)
Wrist	15 (14.0)	15 (14.0)	3 (2.8)
Waist	25 (23.4)	16 (15.0)	10 (9.3)
Neck	58 (54.2)	55 (51.4)	30 (28.0)
Hip	12 (11.2)	12 (11.2)	9 (8.4)
Knee	15 (14.0)	12 (11.2)	6 (5.6)
Ankle	25 (23.4)	22 (20.6)	15 (14.0)

Table 3. Evaluation of employees' musculoskeletal system complaints according to risk factors

Risk Factors	Neck discomfort		Shoulder discomfort		Lower back discomfort		Wrist discomfort	
	N (%)	p	N (%)	P	N (%)	p	N (%)	P
Gender	Male	12(20.0)	4(7.8)	p=0.020 OR=4.7	16(27.6)	p=0.388	3(12.0)	p=0.101
	Female	48(80.0)						
Age	25-34	12(20.0)	15(29.4)	p=0.926	21(36.2)	p=0.125	3(12.0)	p=0.060
		27(45.0)	24(47.1)		19(32.8)		16(64.0)	
	35-44							
	≥45	21(35.0)	12(23.5)		18(31.0)		6(24.0)	
The year she/he worked at the computer	<5 years	15(25.0)	12(23.5)	p=0.969	18(31.0)	p=0.045	6(24.0)	p=0.932
	≥5 years	45(75.0)	39(76.5)		40(69.0)		19(76.0)	
Working hours without break	<4	24(40.0)	17(33.3)	p=0.001 OR=5.6	36(62.1)	p=0.117	13(52.0)	p=0.718
	≥4	36(60.0)	34(66.7)		22(37.9)		12(48.0)	
Smoking	Yes	27(45.0)	18(35.3)	p=0.813	27(46.6)	p=0.004 OR=4.0	9(36.0)	p=0.958
	No	33(55.0)	33(64.7)		31(53.4)		16(64.0)	
Physical activity level	Not enough	32(53.3)	42(82.4)	p=0.001 OR=5.6	40(69.0)	p=0.058	12(48.0)	p=0.136
	Enough	28(46.7)	9(17.6)		18(31.0)		13(52.0)	

OR: Odds ratio

DISCUSSION

This study was planned to investigate the relationship between the frequency of physical musculoskeletal disorders occurring in office workers and the level of physical activity and some factors that may pose a risk for on these disorders. According to the results of our study, the body areas that experienced the most pain in the last 1 year were the waist (54.2%), neck (50.5%), back (45.8%) and shoulder (44.9%). Cho et al. (2012) underlined that the shoulder (77.3%), neck (75.6%) and upper back (63.9%) regions were more affected in office workers using high-density computers. In two different studies, it was reported that the most affected body parts in hospital nurses were legs, waist, neck, knees and ankles, and shoulder region, respectively, and nurses had a high prevalence of waist, shoulder, neck and knee pain (Çalık et al., 2013; Goswami, Ghosh and Sahu, 2017). By Durmaz, Nazlıcan and Akbaba (2018), secretaries working in the hospital were included in the study and musculoskeletal pain

was examined. As a result, it was found that 67% of the secretaries had neck pain, 47% had shoulder pain, and 32% had wrist pain. In the study of Özdemir and Örsal (2021), it was reported that 56% of the nurses working in the intensive care unit had low back pain, 41% had back pain and 39% had neck pain. Although there is no big difference between the results, it is understood that the regions with the most common pain complaints differ between studies. There may be some differences as there are studies carried out between employees who take on different tasks in different departments. It is noteworthy that intense neck and low back pain are observed in secretaries or other office workers who sit in front of the screen for a long time.

There are strong studies in the literature that prove that musculoskeletal disorders are more common in women than men due to computer use (Erdinc, 2011). Gul et al. (2014) reported that women had more pain complaints in their study examining musculoskeletal pain in nurses. Abdollahzade et al.

(2016) reported that musculoskeletal pain is more common in women than in men, as a result of their study in a hospital setting. In our study, gender being female increased the risk of shoulder pain 4.7 times. Shuval and Donchin (2005) stated that being a woman, working more than 10 hours a day, using 7-9 hours a day, and using a computer for more than two years in the workplace are risky for musculoskeletal disorders. It is seen that sitting in front of the computer for a long time is a factor that increases musculoskeletal disorders, apart from being a woman. Therefore, our study included not only the demographic information of the participants but also information about their working life.

According to the results of the logistic regression analysis, the number of years the participants worked at the computer did not increase the likelihood of musculoskeletal system disorders. Similarly, Borhany, Shahid, Siddique et al. (2018) reported that the year of study does not pose a risk in their studies on neck pain in those using computers. As expected, discomfort percentages are higher for those who work more than 4 hours or more. It increased the risk of pain in the neck 5.6 times and the risk of pain in the shoulder 5.2 times. In the study of Durmaz, Nazlıcan and Akbaba (2018), sitting in front of the computer for 4 hours or more without breaks was determined as a risk factor for shoulder region complaints. The risk of daily computer use in terms of neck and shoulder region has been shown in the literature as in our study (Johnston, Souvlis, Jimmieson et al., 2008).

Physical inactivity is a major risk factor for the development of many chronic diseases (Warburton, Nicol and Bredin, 2006). However, studies investigating the relationship between musculoskeletal disorders and physical activity show conflicting results (Briggs, Straker, Bear et al., 2009; Borhany et al., 2018). In some cross-sectional studies, the relationship between physical activity and low musculoskeletal disorder prevalence has been found (Arslan, Koz, Gur et al., 2003). Contrary to these studies, Briggs et al. (2009) reported that there was no relationship between neck/shoulder pain prevalence and physical activity level in their study in adolescents. In the review, it was shown that there was no relationship between sports or other physical activities performed in leisure time and musculoskeletal symptoms (Nam, Song and Lee, 2018). Moreira et al (2016) found a low percentage of musculoskeletal disorders among office workers who met the World Health Organization's recommendation for physical activity. A non-

significant association was demonstrated between high-intensity physical activity and musculoskeletal pain in the past 7 days and 12 months. Nguyen et al (2021) found a negative association between walking and musculoskeletal disorders among office workers. The results suggested that switching from a sitting position to standing or walking in the workplace may reduce the risks of musculoskeletal disorders among office workers. According to the results of our study, the level of physical activity and musculoskeletal disorders were found to be related. Not doing enough physical activity increased the risk of neck pain 2.9 times, the risk of shoulder pain 5.6 times, and the risk of back pain 3.0 times. The fact that there are different results on the subject in the literature may be due to the difference in the populations included in the studies. It is seen that studies conducted especially on office workers suggest that there is a relationship between physical activity level and musculoskeletal disorders, similar to our study. As a result of our study, unlike previous studies, it has been reported that the pain in which body part is associated with the level of physical activity in office workers. The fact that neck, shoulder and back pain is more common in office workers with low physical activity levels is also a guide for future studies. Another prominent feature of our study is that the office workers included in our study are also health workers. Studies conducted with healthcare professionals generally evaluated hospital employees. However, it should not be forgotten that many healthcare professionals work sitting in front of a computer and sitting in front of a computer, rather than in environments such as operating rooms and intensive care units where they need to work standing up.

In the literature, scales based on self-report were used in studies evaluating physical activity and musculoskeletal disorders. Similarly, in our study, using subjective measurement methods and not being able to support the data we obtained with objective result measurements may be another limitation of our study. Since 75.7% of those included in the study were women, this may also be considered as a limitation, as this may have affected the results. In addition, the fact that factors such as working posture and ergonomics of the working environment, which are among the factors that may affect the musculoskeletal disorders of the employees, were not examined, are among the limitations of the study. Although there are many studies indicating that the use of computers in office environments has increased and musculoskeletal

system disorders have become widespread, we see that there are a limited number of studies on loss of workforce, ergonomic regulation and training. In our study, the relationship between musculoskeletal disorders and physical activity level was investigated. However, for future studies, we believe that conducting detailed examinations on these topics with more participants and with more participants will support the literature.

Ethical Approval

Adana City Education and Research Hospital Clinical Research Ethics Committee (Number of meetings: 37, Date: 24/07/2019, Decision no: 503). This study complies with the Declaration of Helsinki.

Authors' Contribution

Idea/concept, design, control/supervision, data collection and/or processing, nalysis and/or interpretation, literature review, writing the article, critical review: Didem YUZUGULLU

Conflicts of Interest

The authors stated that no conflict of interest.

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