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The effect of musculoskeletal system disorders in female office workers

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ABSTRACT

Objectives. This study aimed to analyze the effects of musculoskeletal disorders (MSDs) on the work performance, musculoskeletal fitness and quality of life of female office workers employed at a university. *Methods*. MSDs were evaluated in different body regions with the Cornell musculoskeletal discomfort questionnaire (CMDQ), job performance with the work role functioning questionnaire (WRFQ), musculoskeletal fitness with the musculoskeletal fitness battery (MFB) and quality of life with the short form-12 quality of life questionnaire (SF-12). *Results*. There was a significant weak correlation between job performance and lower back pain (LBP) ($r = -0.21$, $p = 0.01$). There were significant weak to moderate negative correlations between quality of life and CMDQ pain scores for each body part except the back, lower back and hip. There was a significant difference between those who always went to work and those who missed work for 10 days or more only in terms of LBP and hip pain scores ($p = 0.008$, $p = 0.002$). *Conclusion*. Musculoskeletal pain negatively impacts employees' quality of life and work performance. Neck and extremity pain reduce office workers' quality of life, while LBP and hip pain can affect work performance and lead to absenteeism.

KEYWORDS
office workers; ergonomics; musculoskeletal disorders; job performance; musculoskeletal fitness; quality of life

1. Introduction

Musculoskeletal disorders (MSDs) are injuries or disorders of the muscles, nerves, tendons, joints, cartilage and spinal discs. Work-related MSDs are the occurrence, worsening or persistence of such disorders due to working conditions and workload [1]. MSDs are the fourth most common problem faced by office workers worldwide [2]. Long-term inactivity and repetitive movements constitute the basis of the health problems of office workers. For instance, it has been reported that office workers spend about 10.6 h a day sitting and face serious health problems due to inactivity for a long time in the workplace [3]. In 2018, a study of office ergonomics showed that the chair is the most important ergonomic risk factor for MSDs [4]. On the other hand, an office worker performing typing, data entry and analysis at a computer is exposed to repetitive movements with their fingers, wrist and elbows. Health problems that develop as a result of being inactive for a long time in the neck and lower back region, physical fatigue, professional competition and stress caused by work life, together with wrong postures, work and activities that are not done in the right positions and inappropriate office ergonomics may also cause MSDs [5]. In order to reduce the incidence of MSDs associated with computer work, it is necessary to address both physical/ergonomic factors and work organizational and psychosocial factors [6].

Many employees with chronic MSDs have reported impairments in job performance and productivity [7]. While some employees with MSDs continue to work, others stop working, which negatively affects their health and causes serious financial losses [7]. On the other hand, musculoskeletal fitness – which reflects the ability of a muscle or muscle group to exert maximum, rapid or repeated force – also includes a component of flexibility [8]. The musculoskeletal system is an aspect of physical health consisting of muscular strength, endurance and flexibility, and if these three parameters are not maintained then musculoskeletal fitness is compromised, which can significantly affect work life as well [9]. There is increasing evidence for the importance of musculoskeletal fitness as a determinant of health outcomes in both healthy youth and middle-aged people. In adults, musculoskeletal fitness has been linked to other outcomes such as quality of life, cardiovascular disease, frailty, cognitive and functional abilities, and lower back pain (LBP) [10]. It has been observed that a high musculoskeletal fitness level is associated with a lower risk of injury, disability, mortality and fall frequency, as well as higher ability to perform activities of daily living such as increased walking speed, ability to climb stairs and functional capacity which are present in the work environment [9].

This study aimed to investigate the relationship between MSDs and work performance, quality of life and musculoskeletal fitness in female office workers working at the university. The study hypothesized that MSD reduces work efficiency, causes a loss of workforce and increases health expenditures by affecting job performance and musculoskeletal fitness. The impact of success would include improving awareness on MSDs in female office workers which was stated by the European Agency for Safety & Health at Work Report [11].

2. Materials and methods

2.1. Study design and participants

This cross-sectional study evaluated the relationship between MSDs and job performance and musculoskeletal fitness in female office workers. The study was conducted by recruiting female administrative staff working at Süleyman Demirel

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University, who volunteered to participate in the study and signed the informed consent form between February 2019 and June 2019. Inclusion criteria were being female between the ages of 18 and 65 years; working in an office environment; and being active in the profession for at least 1 year. Female office workers with a serious cardiac, orthopedic or neurological diseases were excluded.

Most of the scientific studies on occupational MSDs have reported that females are at higher risk than males, regardless of the type of work or the occupation [12]. The indications that female employees are more affected than males by occupational MSDs and the lack of awareness on this issue were also stated in the European Agency for Safety & Health at Work Report [11]. Therefore, the study specifically focused on investigating female office workers.

2.2. Measurements

Demographics were collected including questions about age, mass, height, working hours, how many years participants have been working, break duration during work, sitting working time and how many days in the past year the participants were absent from work because of their musculoskeletal conditions.

2.2.1. Questionnaires

The Cornell musculoskeletal discomfort questionnaire (CMDQ) was developed by Hedge et al. [13] in order to assess musculoskeletal pain. This study used the Turkish version of the CMDQ as it was valid and reliable in a Turkish population [14]. The questionnaire specifically measures the severity and frequency of MSDs in every part of the body and whether they interfere with work ability. The score obtained for each region is in the range of 0–90. A higher total score indicates a worse outcome in MSDs [14].

Job performance was assessed by the work role functioning questionnaire (WRFQ) [15]. The WRFQ contains 27 questions which give the level of difficulty that people perceive while performing their profession as a percentage of time [15]. It has five sub-scales: work program (five questions), efficiency (seven questions), physical (six questions), mental (six questions) and social (three questions) requirements. A low score means poor job performance [15]. The Turkish version of the WRFQ was found to be valid and reliable in a Turkish population [16].

The short form-12 quality of life questionnaire (SF-12) was used to evaluate the quality of life of the cases. The short form with 12 questions investigates physical function (two questions), social function (one question), limitations due to physical problems (two questions), limitations due to emotional problems (two questions), well-being and mental health (two questions), energy and fatigue (one question), pain (one question) and general health perception (one question). Scores from the scale range from 0 to 60, and high scores indicate good health. Turkish validity and reliability studies were conducted [17,18].

2.2.2. Physical capability measurements

The sit and reach test was used to assess lower extremity and trunk flexibility, the back scratching test to assess upper extremity flexibility, the standard Jamar dynamometer (Patterson Medical by Sammons Preston, USA) to assess grip strength and the musculoskeletal fitness battery (MFB) including the abdominal and lumbar endurance tests to evaluate trunk muscle endurance [19].

2.2.2.1. Sit and reach test. A baseline sit and reach box trunk flexibility tester was used for this test. The person sat on the floor with their legs straight under the test table. When reaching forward, the difference between the point where the fingertips can reach a maximum and the point to which they first reach was accepted as the longest flexibility value; the test was repeated three times and the highest score was recorded [20].

2.2.2.2. Back scratching test. Subjects were asked to try to bring their fingertips as close to each other as possible with their palms facing the back, by external rotation to one arm and internal rotation to the other arm while in a standing position, and to hold this position for 2 s. The difference between the middle fingers of both hands was measured. The difference was recorded as a '– value' when the middle fingers did not touch, '0' when they touched and a '+ value' when one of them passed over the other, recorded in centimeters. After two trials, the best measurement value was accepted as the score [21].

2.2.2.3. Grip strength measurement. The standard Jamar dynamometer was used for this test. Sitting in a chair, with the shoulder in 0° abduction and an anatomically neutral position, while the elbow is in 90° flexion, the participant held the dynamometer for a maximum of 3 s. They were then asked to squeeze with all their might. The averages of three measurements from both sides were taken, with 30 s between measurements, and rest breaks were given. For the measurement of maximum grip strength, individuals were asked to do the maximum grip they could and it was recorded in kilograms [22].

2.2.2.4. Trunk muscle endurance: evaluation of abdominal muscle endurance. Subjects were asked to lie in a supine position on a mat laid on the floor with their knees and hips flexed at 90°. Crossing their hands on the shoulders and maintaining the anatomical neutral position of the pelvis, they were asked to flex the cervical region and upper body as much as possible. The time required for the test without deteriorating the position was recorded in seconds by means of a stopwatch [23].

2.2.2.5. Lumbar muscle endurance assessment. Subjects were asked to lie in a prone position on a mat laid on the floor. The lower abdominal region was supported by a thin pillow, and the sternum was lifted from the ground while maintaining the anatomical neutrality of the pelvis and thoracic region. The time during which the test position could be maintained was recorded in seconds by means of a stopwatch [23].

2.3. Sample size calculation

The sample size was calculated using Epi-info (version number 7.2.5). There were 198 female office workers in the university. The frequency for the population size was taken as 50% and the acceptable error margin was 10%. For the population of 198, the sample size was calculated as 130 at the 99.99% confidence level . With the systematic random sample selection, 130 people were determined with the help of the random numbers table according to the employee list.

2.4. Statistical analysis

The personal and sociodemographic information of the participants and data on the working life and health status were defined with the mean, standard deviation, percentage and ratio. The Mann–Whitney *U* test or *t* tests were used for pairwise comparisons (presence of pain) based on whether the data are normally distributed or not. Pearson or Spearman correlation coefficients were used based on the data distribution to analyze the relationships between CMDQ pain scores for each body part and WRFQ, MFB and SF-12 values. Correlation coefficients were classified as < 0.3, 0.3–0.5 and > 0.50 representing weak, moderate and strong, respectively [24]. Subsequently, regression analysis was performed to further explore these relationships. IBM SPSS Statistics version 20.0 was used for statistical analysis and the statistical significance level was accepted as $p < 0.05$.

3. Results

The study contacted 198 female office workers working at Süleyman Demirel University between February 2019 and May 2019. A total of 115 female office workers (age 38.9 ± 6.9 years, body mass index [BMI] 25.0 ± 4.7, 4.2 ± 1.6 working years) volunteered and were eligible for the study. Demographics, work-related information and patient-reported outcome measurements score are presented in Table 1. The most three common body parts with pain reported by participants were the neck (69.6%), back (65.2%) and lower back (52.2%).

Female office workers with musculoskeletal pain had lower job performance ($p < 0.001$) and quality of life ($p < 0.001$) compared to those without pain. There were no statistically significant differences between individuals with and without pain in any parameter of the MFB (all $p > 0.05$). Statistical differences between individuals with and without pain are presented in Table 2.

There were significant weak correlations between the CMDQ neck pain severity score and the SF-12 score ($r = -0.23$, $p = 0.01$) and WRFQ total score ($r = -0.27$, $p = 0.003$). The regression model for the CMDQ neck pain severity score included the WRFQ total score and SF-12 total score as independent variables to identify potential factors influencing the CMDQ neck pain severity score. The SF-12 was found to be the only determinant of the CMDQ neck pain severity score, accounting for 5.8% of the variance (Table 3).

There were significant weak correlations between CMDQ LBP severity and the SF-12 ($r = -0.37$, $p = 0.001$), MFB abdominal endurance ($r = -0.20$, $p = 0.03$) and WRFQ ($r = -0.21$, $p = 0.01$). The regression model for the CMDQ LBP severity score included the WRFQ total score, MFB abdominal endurance test score and SF-12 total score as independent variables to identify potential factors influencing the CMDQ LBP severity score. The WRFQ total score was found to be the only determinant of the CMDQ LBP severity score, accounting for 8.2% of the variance (Table 3).

There were significant weak correlations between right and left upper extremity pain severity and the SF-12 ($r = -0.20$, $p = 0.03$; $r = -0.28$, $p = 0.0032$) and WRFQ ($r = -0.21$, $p = 0.02$; $r = -0.28$, $p = 0.003$). The regression model for the CMDQ right upper extremity pain severity score included

Table 1. Participants' descriptive features.

Demographic ($n = 115$)	Mean ± *SD* or *n* (%)
Age (years)	38.9 ± 6.9
Body mass index	25.0 ± 4.7
Working years	4.2 ± 1.6
Sitting work time (h)	6.1 ± 1.7
Work hours until rest	3.4 ± 1.8
Work hours until rest	
≤ 2 h	40 (34.8%)
> 2 h	75 (65.2%)
Married:single	83 (72.2%):32 (27.8%)
Education	
High school	31 (27.0%)
Undergraduate	80 (69.5%)
Postgraduate	4 (3.5%)
Physical activity frequency	
None	36 (31.3%)
Irregular	72 (62.6%)
Regular	7 (6.1%)
Being absent from work	
None	101 (87.8%)
≥ 10 days	4 (3.5%)
Presence of pain	
Yes	90 (78.2%)
No	25 (21.8)
CMDQ pain severity scores	
Neck	10.9 ± 19.6
Back	12.6 ± 28.6
Lower back	9.5 ± 19.4
Right shoulder	1.37 ± 0.61
Left shoulder	1.33 ± 0.54
Right upper arm	1.19 ± 0.46
Left upper arm	1.11 ± 0.37
Right forearm	1.15 ± 0.41
Left forearm	1.10 ± 0.36
Right wrist	1.17 ± 0.44
Left wrist	1.14 ± 0.40
Hip	2.2 ± 6.6
Right upper leg	1.15 ± 0.40
Left upper leg	1.11 ± 0,37
Right knee	1.26 ± 0.51
Left knee	1.24 ± 0.51
Right lower leg and foot	1.20 ± 0.47
Left lower leg and foot	1.20 ± 0.50
WRFQ total score	117.1 ± 13.8
MFB test	
Right grip strength (kg)	59.5 ± 10.6
Left grip strength (kg)	54.4 ± 10.9
Right back scratch (cm)	3.3 ± 6.5
Left back scratch (cm)	−1.5 ± 7.6
Sit and reach (cm)	28.3 ± 7.2
Abdominal endurance (sn)	85.3 ± 63.9
Lumbar endurance (sn)	120.4 ± 84.6
SF-12 scores	
Physical	44.53 ± 8.15
Mental	44.93 ± 10.87
Total	89.47 ± 13.91

Note: CMDQ = Cornell musculoskeletal discomfort questionnaire; MFB = musculoskeletal fitness battery; SF-12 = short form-12 quality of life questionnaire; WRFQ = work role functioning questionnaire.

Table 2. Job performance, musculoskeletal fitness and quality of life comparisons based on the presence of pain.

Score	Presence of pain		
	Yes	No	*p*
MFB right grip strength	58.90 ± 10.20	60.92 ± 11.35	0.34
MFB left grip strength	54.12 ± 10.13	54.84 ± 12.37	0.74
MFB back scratch test right upper extremity	3.42 ± 0.71	3.16 ± 1.15	0.81
MFB back scratch test left upper extremity	−1.60 ± 0.87	−1.27 ± 1.25	0.73
MFB sit and reach	28.03 ± 7.20	28.95 ± 7.24	0.52
MFB abdominal endurance	79.82 ± 66.48	96.81 ± 57.10	0.54
MFB lumbar endurance	117.52 ± 90.37	126.51 ± 71.79	0.26
WRFQ total	114.29 ± 14.03	123.05 ± 11.3	**< 0.001**
SF-12 total	86.18 ± 14.19	96.40 ± 10.46	**< 0.001**

Note: MFB = musculoskeletal fitness battery; SF-12 = short form-12 quality of life questionnaire; WRFQ = work role functioning questionnaire; bold Values: Indicate statistically significant results (e.g., $p < 0.05$)..

the WRFQ total score and SF-12 total score as independent variables to identify potential factors influencing the CMDQ right upper extremity pain severity score. It was found that the SF-12 was the only determinant in the CMDQ right upper extremity pain severity score, accounting for 7.7% of the variance. The regression model for the CMDQ left upper extremity pain severity score included the WRFQ total score, MFB lumbar endurance score and SF-12 total score as independent variables to identify potential factors affecting the CMDQ left upper extremity pain severity score. The SF-12 was found to be the only determinant in the CMDQ left upper extremity pain severity score, accounting for 12% of the variance (Table 3).

There were significant weak correlations between right and left upper extremity pain severity and the SF-12 ($r = -0.20$, $p = 0.03$; $r = -0.28$, $p = 0.0032$) and the WRFQ ($r = -0.21$, $p = 0.02$; $r = -0.28$, $p = 0.003$). The regression model for the CMDQ right lower extremity pain severity score included the WRFQ total score and SF-12 total score as independent variables to identify potential factors influencing the CMDQ right lower extremity pain severity score. It was found that the SF-12 was the only determinant in the CMDQ right lower extremity pain severity score, accounting for 13% of the variance. The regression model for the CMDQ left lower extremity pain severity score included the WRFQ total score and SF-12 total score as independent variables to identify potential factors influencing the CMDQ left lower extremity pain severity score. The SF-12 was found to be the only determinant in the CMDQ left lower extremity pain severity score, accounting for 9.4% of the variance (Table 3).

When the groups were compared, there was a significant difference between those who always went to work and those who missed work for 10 days or more only in terms of LBP and hip pain scores ($p = 0.008$, $p = 0.002$), as presented in Table 4.

There is a significant difference ($p = 0.036$) in WRFQ total scores between employees who took a break after working for more than 2 h and employees who took a rest break before 2 h of work, as presented in Table 5.

4. Discussion

The main purpose in this study was to examine the relationship between musculoskeletal system problems and job performance, musculoskeletal fitness and quality of life in female individuals working in an office environment at a university.

As a result of the study, it was observed that the most affected anatomical regions were 69.6% neck, 65.2% back, 52.2% lower back, 48.2% right shoulder and 40.0% left shoulder, and in general similar results were obtained in the literature [25–28]. MSDs and related musculoskeletal pain occur in office workers due to repetitive movements, sitting for a long time and working in the wrong posture, using only a few special muscles while working [29]. de Vries et al. [7] showed that chronic non-specific musculoskeletal pain negatively affects the job performance of employees. del Pozo-Cruz et al. [19] reported low quality of life in office workers with non-specific LBP. Küçük et al. [30] conducted a study with 213 office workers and found that the disability due to LBP is higher especially in female office workers. Thus, this might be a factor that hinders work and reduces quality of life [30]. In our study, job performance was significantly lower in employees with pain compared to those without pain, which was in parallel with the literature.

Although there are many studies examining the effect of MSDs on job performance, there are few studies that directly evaluate this effect on female office workers. de Vries et al. [7] conducted a cross-sectional study with 119 office workers and determined that employees with MSDs reported lower job performance [7]. On the other hand, it was reported that the severity of musculoskeletal pain and the frequency of musculoskeletal symptoms in office workers were highly correlated with low job satisfaction and work ability [27,31]. Our study found that pain in the lower back is associated with low job performance. However, upper extremity pain did not cause a significant difference in job performance. It can be thought that this condition is caused by the fact that the problems caused by repeated and continuous use of the upper limbs are not specifically defined by the staff.

For the relationship between musculoskeletal system problems and the level of musculoskeletal fitness, it was reported that LBP reduces the level of musculoskeletal fitness due to the weakness caused by the back and trunk muscles and the subsequent deterioration of the spinal mechanics [32]. del Pozo-Cruz et al. [19] conducted a cross-sectional study with 190 office workers and found a low level of musculoskeletal fitness in female office workers with non-specific LBP. However, contrary to the literature, we observed that musculoskeletal fitness level was not affected in office workers with musculoskeletal pain. The discrepancy between our findings and the literature may be due to differences in sample demographics, measurement tools and work environment conditions.

The negative effects of musculoskeletal pain on the job performance of employees are present in the literature. However, there is also conflicting evidence in the literature investigating the effect of the severity of pain. de Vries et al. [7] found no significant relationship between musculoskeletal pain severity and job performance of employees. Loghmani et al. [27] reported a negative correlation between musculoskeletal pain severity and employee job satisfaction in their study of 91 office workers working in a university setting. In our study, a significant relationship was found between the severity of only LBP and the job performance of the employees. Accordingly, the job performance scale values of the personnel with high pain intensity were found to be low.

Table 3. Correlations between CMDQ pain scores for each body part and WRQF performance, musculoskeletal fitness and quality of life.

CMDQ pain severity score		WRFQ total	MFB right grip strength	MFB left grip strength	MFB back scratch test right upper extremity	MFB back scratch test left upper extremity	MFB sit and reach	MFB abdominal endurance	MFB lumbar endurance	SF-12 total
Neck	*r*	−0.23	−0.03	−0.01	0.06	0.01	0.18	−0.05	−0.02	−0.27
	p	**0.01**	0.71	0.88	0.51	0.90	0.048	0.56	0.81	**0.003**
		Regression equation formula: 2.511 + (−0.011 × SF-12 score), adjusted $R^2 = 0.058$, $p = 0.005$								
Back	*r*	−0.01	−0.08	−0.08	0.19	0.12	0.02	−0.13	−0.09	−0.11
	p	0.89	0.36	0.34	**0.04**	0.20	0.82	0.13	0.34	0.20
		No variables entered into the equation								
Lower back	*r*	−0.21	−0.03	−0.01	−0.03	−0.12	−0.18	−0.20	−0.09	−0.37
	p	**0.01**	0.70	0.92	0.72	0.20	0.049	**0.03**	0.33	**0.001**
		Regression equation formula: 58.877 + (−0.422 × WRFQ total score), adjusted $R^2 = 0.082$, $p = 0.003$								
Right upper extremity	*r*	−0.20	−0.14	−0.13	−0.08	−0.10	−0.11	−0.09	−0.12	−0.28
	p	**0.03**	0.14	0.17	0.39	0.28	0.24	0.34	0.21	**0.002**
		Regression equation formula: 33.946 + (−0.308 × SF−12), adjusted $R^2 = 0.077$, $p = 0.002$								
Left upper extremity	*r*	−0.21	−0.17	−0.17	−0.13	0.11	−0.14	−0.16	−0.18	−0.28
	p	**0.02**	0.08	0.07	0.17	0.26	0.13	0.08	**0.05**	**0.003**
		Regression equation formula: 24.993 + (−0.243 × SF-12 score), adjusted $R^2 = 0.12$, $p = 0.001$								
Hip	*r*	−0.19	−0.13	−0.13	−0.07	−0.03	−0.05	−0.01	−0.20	−0.23
	p	**0.04**	0.17	0.15	0.48	0.74	0.59	0.89	**0.03**	**0.01**
		No variables entered into the equation								
Right lower extremity	*r*	−0.37	−0.13	−0.19	−0.04	−0.16	−0.31	−0.04	−0.01	−0.37
	p	**0.001**	0.14	0.03	0.61	0.07	0.74	0.65	0.84	**0.001**
		Regression equation formula: 82.492 + (−0.775 × SF-12), adjusted $R^2 = 0.135$, $p = 0.001$								
Left lower extremity	*r*	−0.31	−0.11	−0.16	−0.01	−0.15	−0.01	−0.01	−0.02	−0.31
	p	**0.001**	0.24	0.07	0.99	0.09	0.83	0.91	0.82	**0.001**
		Regression equation formula: 78.905 + (−0.740 × SF-12), adjusted $R^2 = 0.094$, $p = 0.001$								

Note: CMDQ = Cornell musculoskeletal discomfort questionnaire; MFB = musculoskeletal fitness battery; SF-12 = short form-12 quality of life questionnaire; WRFQ = work role functioning questionnaire; bold Values: Indicate statistically significant results (e.g., $p < 0.05$).

Table 4. Comparing work absence in individuals with musculoskeletal disorders.

CMDQ pain severity score	Presenteeism: Those who always go to work	Presenteeism: Those who cannot go to work for ≥ 10 days	p
Neck	10.45 ± 18.96	32.00 ± 50.31	0.25
Back	10.49 ± 21.94	80.33 ± 118.15	0.15
Lower back	7.68 ± 17.59	31.50 ± 24.96	**< 0.008**
Right shoulder	6.62 ± 15.40	7.50 ± 2.29	0.13
Left shoulder	10.49 ± 21.94	14.10 ± 16.79	0.15
Right upper arm	3.31 ± 9.85	3.00 ± 6.18	0.51
Left upper arm	10.82 ± 27.08	13.45 ± 17.10	0.09
Right forearm	6.42 ± 13.30	6.00 ± 8.05	0.14
Left forearm	11.29 ± 20.54	13.33 ± 17.72	0.23
Right wrist	4.41 ± 9.92	4.11 ± 7.25	0.27
Left wrist	3.72 ± 9.48	4.10 ± 8.14	0.33
Hip	1.81 ± 6.03	5.66 ± 5.68	**< 0.002**
Right upper leg	12.35 ± 17.97	3.12 ± 6.24	0.42
Left upper leg	13.29 ± 20.12	14.35 ± 16.90	0.17
Right knee	6.98 ± 13.49	6.13 ± 8.53	0.21
Left knee	6.75 ± 14.63	12.9 ± 18.02	0.25
Right lower leg and foot	11.51 ± 20.85	3.11 ± 6.27	0.31
Left lower leg and foot	4.41 ± 8.93	4.22 ± 8.54	0.37

Note: CMDQ = Cornell musculoskeletal discomfort questionnaire; bold Values: Indicate statistically significant results (e.g., $p < 0.05$).

Table 5. Employees' job performance scale according to break duration total comparison of scores.

Score	Break duration: 1–2 h	Break duration: > 2 h	p
WRFQ total	119.47 ± 13.95	114.04 ± 13.14	**< 0.03**

Note: WRFQ = work role functioning questionnaire; bold Values: Indicate statistically significant results (e.g., $p < 0.05$).

A review of the literature reveals recent studies on office workers that demonstrate the negative impact of musculoskeletal pain severity on quality of life. In a study conducted with 241 office employees from a public institution in Turkey, it was observed that increasing musculoskeletal pain adversely affected both work life and quality of life [33]. Another study published in 2023 observed that office workers experiencing high levels of musculoskeletal pain demonstrated significant reductions in both quality of life and corporate performance [34]. Our study found that increasing musculoskeletal pain in the neck, lower and upper extremities reduced quality of life, while lumbar pain decreased work performance, aligning with the existing literature.

When the literature is examined, it is seen that musculoskeletal system pains in certain body parts result in absenteeism. Justesen et al. [35] reported that 27.8% of employees could not go to work due to health problems, and 12.3% of this rate was due to neck pain and 14.1% was due to LBP. Lardon et al. [36] reported that pain severity was one of the reasons for absence from work in employees with chronic LBP. According to the findings of our study, employees with pain especially in the lower back and hip region stay away from work. No significant difference was found between pain in other body parts and the inability to go to work. We think that this is due to the fact that LBP and hip pain affect mobility more than other body parts.

For office workers, work breaks can prevent the negative effects of prolonged static posture and repetitive movements, which are important risk factors for MSD [37]. In their study of 218 office workers, Ortiz-Hernández et al. [38] reported that musculoskeletal complaints decreased with decreased sitting time and increased rest intervals. Robertson et al. [39] reported in a randomized controlled study with office workers that the work performance values of the group that received ergonomics training including rest interval parameters were higher than those in the control group. Balcı et al. [40] investigated the effect of two different rest periods and reported that employees who took more frequent breaks made fewer errors, and thus work performance was positively affected. In our study, a significant relationship was found in the total job performance scores of employees who took break durations during working hours longer than 2 h, which is similar to the literature. Accordingly, employees who take more frequent breaks have higher job performance values.

The main limitation of our study is that findings are not generalizable as only university administrative staff were recruited. The possibility that the individuals' instant well-being could influence their answers to the questionnaires or the results obtained during the musculoskeletal measurements may affect the objectivity of the findings. Lastly, we focused on female individuals, so the fact that no comparisons could be made between the sexes can be considered a limitation.

5. Conclusion

The areas where musculoskeletal pain is most commonly felt by office workers working at our university are the neck, back, waist and shoulder areas. Musculoskeletal system pain negatively affects the quality of life and work performance of employees. Increased pain especially in the neck, lower and upper extremities decreases the quality of life of office workers, while increased LBP decreases work performance. Especially, LBP and hip pain may cause absenteeism. If employees take a rest break before completing 2 h of work, their job performance is positively affected.

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Disclosure statement

No potential conflict of interest was reported by the authors.

Ethical approval

The research study was carried out per the Declaration of Helsinki and complied with regulations and institutional policies. Participants were informed about the study details approved by Süleyman Demirel University Non-Interventional Clinical Research Ethics Committee on January 16, 2019 (Decision no.: 14). Informed consent has been obtained from all volunteered individuals included in this study.

Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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