Original Article

Job Stress and its Relationship with the Musculoskeletal Disorders among Office Workers of Zahedan University of Medical Sciences, Iran

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Abstract

Background and Purpose: Job stress is an important psychological factor. Musculoskeletal disorders are among the most common causes of disability in industrialized and developing countries. Therefore, this study aimed to assess job stress and its relationship with the prevalence of musculoskeletal disorders in office workers of Zahedan University of Medical Sciences, Iran.

Materials and Methods: A total of 234 office workers from Zahedan University of Medical Sciences were selected by census sampling. Data were collected using the Health and Safety Executive's Management Standards Indicator Tool and the Cornell Musculoskeletal Discomfort Questionnaire. Pearson's correlation coefficients, independent t-test, analysis of variance, and chi-square tests were performed to analyze the data.

Results: The mean age and work experience of the participants were 35.25 ± 8.37 and 9.20 ± 2.64 years, respectively. The mean stress scores of men and women were 95.6 ± 13.1 and 95.2 ± 14.8, respectively. Stress showed a significant relationship with pain intensity in the middle and lower back, shoulders, and wrists. It was also significantly related with the frequency of pain in the neck, upper back, middle back, lower back, (left) shoulder, and both wrists ($P \leq 0.050$).

Conclusion: There were significant relationships between stress and pain in different parts of the body among office workers. In fact, high levels of stress were associated with musculoskeletal disorders and pain in different limbs of the subjects. Hence, stress reduction programs should be implemented to control the levels of stress and the incidence of musculoskeletal disorders among the studied workers.

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1. Introduction

Stress is the body's immune response to harmful stimuli (1). Some studies have shown that about 30% of labor forces in developed countries suffer from job stress. This rate is higher in developing countries. According to the National Institute for Occupational Safety and Health, job stress occurs when the requirements of a job do not match the worker's capabilities, resources, or demands. Apparently, this definition considers not only the workers' capabilities and resources but also their needs (2).

During the recent decades, job transition has complicated job-related issues and human relations in the workplace and resulted in job stress (3). Highlighting the significance of job stress as a psychological factor, the United Nations introduced the condition as the 20th century disease in 1992. According to the International Labor Organization, the costs imposed by job stress range between 1% and 3.5% of countries' gross domestic product (4). Based on the model developed Ley and Schleifer, stressful events increase people's respiratory rate, and thus decrease carbon dioxide levels in their blood and elevate their blood pH. Such changes disturb their metabolism and affect their physical conditions (5,6).

The prevalence of job stress has been reported as 21.3% in Iran (7), 40% among workers in northwestern America (8), 10% among the industrial workers of Europe (8), and 20% among South Korean workers (9).

Musculoskeletal disorders are one of the most common occupational injuries and disabilities in industrialized and developing countries (10,11). These disorders damage muscles, tendons, and nerves and manifest as pain, discomfort, and numbness in the involved organ (12). Work-related musculoskeletal disorders are the major cause of absence from work, increased expenses, and occupational injuries (13) and impose heavy costs on the occupational health of countries (14). Spending long hours mainly working with computers at the workplace has turned musculoskeletal problems into a main concern for office workers (15,16). Research on the etiology of musculoskeletal pains has suggested several factors including high job demand, low job control, poor social support from the workplace, inadequate rest time, and repetitive tasks to be responsible for the development of these pains (17).

Studies in Europe and America have estimated the prevalence of upper and lower extremity muscle disorders at 20-64% (18,19). According to the Health Deputy of the Iranian Social Security Organization, musculoskeletal disorders are to blame for 14.4% of all disabilities in the country. These disorders are also the most frequent cause of visits to the primitive medical commissions of the mentioned organization (20).

The latest reports of the Health and Safety Executive (HSE) have identified musculoskeletal disorders and job stress as two major causes of occupational diseases (21). Job stress has been proved to adversely affect the workers' health and quality of life and increase the risk of occupational accidents. It has a negative correlation with individual performance (22) and may lead to the early retirement of the workers (23) and the incidence of physical problems such as musculoskeletal pains (24) and cardiovascular diseases (25). In addition, among the various psychological characteristics of humans, stress is one of the most important factors influencing people. A direct relationship between stress and musculoskeletal disorders has also been established (21).

Therefore, stress seems to play a critical role in determining the psychological state of the workers. The prevalence of musculoskeletal disorders among the workers is increasing due to poor posture. Since job stress can exacerbate musculoskeletal disorders and pain in different limbs, thus, this study aimed to assess job stress and its

relationship with the musculoskeletal disorders among office workers in Zahedan University of Medical Sciences (southeast of Iran). We hope that our findings can facilitate future plans to reduce job stress and correct the posture of staff.

2. Materials and Methods

This cross-sectional study was conducted on 234 office workers in Zahedan University of Medical Sciences (southeastern Iran) in 2014. The research population included all office workers of Zahedan University of Medical Sciences. Based on research objectives and assumptions, two questionnaires were used to collect data. The first questionnaire was the Cornell Musculoskeletal Discomfort Questionnaire (CMDQ), i.e., a diagram indicating musculoskeletal disorders (body map). The CMDQ assesses the frequency and severity of pain in 17 body parts (on both left and right sides of the body). Items on frequency have five choices including never, 1-2 times/year, 1-2 times/month, 1-2 times/week, and 1-2 times/day scored as 0-4, respectively. Severity items are also scored as 0-5 (indicating no discomfort, slight discomfort, moderate pain with no interference in activity, severe pain limiting activity, and intolerable pain inhibiting work). The top part of the same questionnaire contained the demographic characteristics of the participants. The content validity of the questionnaire was confirmed by experts. Moreover, Cronbach's alpha of 0.73 suggested its reliability.

The HSE's 35-item Management Standards Indicator Tool was used to assess job stress. Although the questionnaire had been previously validated by Marzabadi et al. (24), its content validity (evaluated by experts) and split-half reliability (Cronbach's alpha = 0.78 and 0.75) were reconfirmed in the present research. Stress levels were quantified by calculating mean scores.

The participants were provided with the questionnaires and explanations on how to complete them. The questionnaires were collected at the time determined by the participants. Descriptive statistics, Pearson's correlation coefficients, independent t-tests, one-way analysis of variance (ANOVA), and chi-square tests were used to analyze the data. The normality of variables was evaluated and confirmed by Kolmogorov–Smirnov tests. All analyzes were performed in SPSS 16.0 (SPSS Inc., Chicago, IL, USA).

3. Results

Overall, 234 office workers were surveyed. The subjects' mean age and work experience were 35.25 ± 8.37 and 9.20 ± 2.64 years, respectively. Most participants were married (n = 185; 79.1%) and 49 subjects (20.9%) were single. While two individuals (0.9%) had 8 years of education, high school diplomas, associate, Bachelor's degree, Master's degree, and Ph.D. were held by 16 (6.8%), 28 (12%), 125 (53.4%), 57 (24.4%), and 6 (2.6%) subjects, respectively. A total of 33 participants (14.1%) had experienced pain in different limbs before starting to work in the university. The mean body mass index (BMI) of the participating workers was calculated as 25.08 ± 4.63 kg/m^2. The subjects worked for 8.20 ± 0.81 hours/day and 5.12 ± 0.51 days/week. Moreover, their mean stress level was computed as 95.5 ± 14.8.

According to the obtained Pearson's correlation coefficients, job stress was not significantly related with age, work experience, weight, height, the number of working hours per day, the number of working hours per week, and BMI. The mean scores of stress in married and unmarried people were 93.9 ± 11.8 and 94.4 ± 11.7, respectively (P = 0.090). The mean scores of stress in men and women were 95.6 ± 13.1 and 95.2 ± 14.8, respectively (P = 0.690). The mean scores of stress in subjects with junior

high school education, high school diploma, associate degree, Bachelor's degree, Master's degree, and Ph.D. were 99.0 ± 33.3, 99.5 ± 10.1, 100.1 ± 14.8, 96.5 ± 14.3, 95.1 ± 12.6, and 102.6 ± 14.1, respectively. The results of ANOVA showed the absence of significant differences in stress scores between individuals with different levels of education (P = 0.230).

Complaints and disorders in the neck and upper back had the highest frequency among the participants (78.2% and 77.8%, respectively). The least frequent complaints were about palm issues (44.4%). Chi-square test suggested the frequency of pain in the neck and back to be significantly related with age, work experience, and marital status.

Table 1 summarizes the frequency and intensity of pain in different limbs. As seen, the greatest pain intensity was detected in the right knee, i.e., 9.8% (n = 23) of the subjects had intolerable pain in this area. Furthermore, neck pain had the highest frequency, i.e., 20.9% (n = 49) of the participants experienced this pain 1-2 times a day.

The relationships between stress and pain frequency and intensity in different limbs are presented in table 2. Apparently, there were significant relationships between stress and pain intensity in the middle and lower back, shoulders, and both wrists ($P \leq 0.050$). Stress was also significantly related with pain frequency in the neck, upper back, middle back, lower back, (left) shoulder, and right and left wrists ($P \leq 0.050$).

Due to the absence of significant relationships between demographic variables and stress, these variables were not considered as confounding factors and were not hence entered into multivariate models.

4. Discussion

The present study evaluated the prevalence of musculoskeletal disorders and their relationships with job stress in university staff. While complaints about problems in the neck and upper back had the highest frequency (78.2% and 77.8%, respectively), complaints about palm problems were the least frequent (44.4%). Aging naturally decreases motor function and physical capacity. Greater incidence of musculoskeletal disorders and pain caused by less flexibility and inappropriate working techniques and posture is thus expected at higher age (26,27). Studies have shown associations between higher age and decreased body size, muscle strength, and upper limbs function as well as increased rate of musculoskeletal disorders (28).

Although previous research has suggested a significant relationship between the prevalence of musculoskeletal disorders and work experience (29,30), no such a relationship was found in the current study. Similar to our findings, Akrouf et al. (31) failed to establish a significant relationship between work experience and musculoskeletal disorders among office workers. Furthermore, in the present study, the prevalence of musculoskeletal disorders was not significantly related with the participants' height and weight. While Rahnama et al. (32) reported comparable findings, Haghdoost et al. and Ferreira et al. highlighted significant relations between the two mentioned variables and the incidence of musculoskeletal disorders (28,31). Moreover, we did not detect significant relationships between BMI and the prevalence of musculoskeletal disorders in various limbs. Similar findings were documented by Ferreira and Saldiva (30) and Zvolensky et al. (33) that declared no relationship between BMI and chronic pain in different part of participant bodies.

Our findings did not reveal significant relationships between stress and demographic variables. In contrast, Cohen et al. (34) stated that stress increased with decreasing age, education, and income. However, it seems that stress can affect individuals regardless of their work experience, age, gender, and marital status.

Table 1. Pain frequency and intensity in different limbs of office workers in Zahedan University of Medical Sciences, Iran

Assessed limb	Frequency, N (%)				Severity, N (%)				Without pain
	1-2 time a day	1-2 time a week	1-2 time a month	1-2 time a year	Intolerable pain	Severe pain with decreasing in activity	Tolerable pain without decreasing in activity	Low	
Neck	49 (20.9)	45 (19.2)	54 (23.1)	48 (20.5)	16 (6.8)	30 (12.8)	67 (28.6)	70 (29.9)	51 (21.8)
Upper back	28 (12)	40 (17.1)	53 (22.6)	54 (23.1)	14 (6)	21 (9)	66 (28.2)	67 (28.6)	66 (28.2)
Middle back	28 (12)	32 (13.7)	55 (23.5)	51 (21.8)	12 (5.1)	21 (9)	57 (24.4)	65 (27.8)	79 (33.8)
Lower back	46 (19.7)	36 (15.4)	55 (23.5)	39 (16.7)	16 (6.8)	39 (16.7)	56 (33.9)	56 (23.9)	67 (28.6)
Shoulder (right)	30 (12.8)	41 (17.5)	38 (16.2)	56 (23.9)	15 (6.4)	32 (13.7)	47 (20.1)	62 (26.5)	78 (33.3)
Shoulder (left)	17 (7.3)	31 (13.2)	40 (17.1)	38 (16.2)	10 (4.3)	27 (11.5)	52 (22.2)	51 (21.8)	94 (40.2)
Arm (right)	17 (7.3)	18 (7.7)	38 (16.2)	62 (26.5)	12 (5.1)	17 (7.3)	31 (13.2)	68 (29.1)	106 (45.3)
Arm (left)	11 (14.7)	19 (8.1)	39 (16.7)	55 (23.5)	10 (4.3)	13 (5.6)	29 (12.4)	68 (29.1)	114 (48.3)
Elbow (right)	16 (6.8)	16 (6.8)	18 (7.7)	73 (31.2)	12 (5.1)	7 (3)	24 (10.3)	73 (31.2)	118 (50.4)
Elbow (right)	11 (14.7)	12 (5.1)	20 (8.5)	65 (27.8)	13 (5.6)	9 (3.4)	17 (7.3)	66 (38.2)	129 (50.1)
Forearm (right)	11 (14.7)	18 (7.7)	26 (11.1)	60 (25.6)	10 (4.3)	11 (14.7)	24 (10.3)	69 (29.5)	120(51.3)
Forearm (left)	4 (1.7)	13 (5.6)	21 (9)	58 (24.8)	6 (2.6)	7 (3)	18 (7.7)	65 (27.8)	138 (59)
Wrist (right)	28 (21)	34 (14.5)	39 (16.7)	49 (20.9)	18 (7.7)	26 (11.1)	44 (18.8)	54 (23.1)	92 (39.3)
Wrist (left)	13 (5.6)	27 (11.5)	29 (12.4)	50 (21.4)	14 (6)	14 (6)	33 (14.1)	57 (24.4)	116 (49.6)
Palm (right)	19 (8.1)	9 (3.8)	15 (6.4)	65 (27.8)	10 (4.3)	13 (5.6)	14 (60	67 (28.6)	130 (55.6)
Palm (left)	9 (3.8)	13 (5.6)	10 (4.3)	68 (29.1)	8 (3.4)	10 (4.3)	13 (5.6)	63 (26.9)	140 (59.8)
Fingers (right)	23 (9.8)	28 (12)	34 (14.5)	50 (21.4)	15 (6.4)	24 (10.3)	36 (15.4)	56 (23.9)	103 (44)
Fingers (left)	13 (5.6)	21 (9)	26 (11.1)	51 (21.8)	10 (4.3)	19 (8.1)	21 (9)	62 (26.5)	122 (52.1)
Buttock (right)	18 (7.7)	12 (5.1)	26 (11.1)	58 (24.8)	10 (4.3)	14 (6)	20 (8.5)	65 (27.8)	125 (53.4)
Buttock (left)	19 (8.1)	11 (14.7)	17 (7.3)	63 (26.9)	12 (5.1)	9 (3.8)	15 (6.4)	69 (29.5)	129 (55.1)
Thigh (right)	13 (5.6)	16 (6.8)	29 (12.4)	54 (23.1)	12 (5.1)	12 (5.1)	26 (11.1)	58 (24.8)	126 (53.8)
Thigh (left)	11 (14.7)	20 (8.5)	22 (9.4)	56 (23.90	12 (5.1)	15 (6.4)	24 (10.3)	55 (23.5)	128 (54.7)
Knee (right)	33 (14.1)	36 (15.4)	47 (20.1)	32 (13.7)	23 (9.8)	33 (14.1)	44 (18.8)	47 (20.1)	87 (37.2)
Knee (left)	31 (13.2)	38 (16.02)	47 (20.1)	36 (15.4)	19 (8.1)	37 (15.8)	50 (21.4)	43 (18.4)	85 (36.3)
Leg (right)	16 (6.8)	24 (10.3)	27 (11.5)	50 (21.4)	8 (3.4)	22 (9.4)	32 (17.7)	57 (24.4)	115 (49.1)
Leg (left)	17 (7.3)	20 (8.5)	27 (11.5)	53 (22.6)	11 (4.7)	19 (8.1)	23 (9.8)	59 (25.2)	122 (52.1)
Talus-ankle (right)	21 (9)	31 (13.2)	57 (24.4)	110 (47)	3 (1.3)	19 (8.1)	33 (14.1)	64 (27.4)	115 (49.1)
Talus-ankle (left)	21 (9)	28 (12)	54 (23.1)	118 (50.4)	8 (3.4)	18 (7.7)	32 (13.7)	54 (23.1)	122 (52.1)
Sole (right)	29 (12.4)	26 (11.1)	51 (21.8)	104 (44.4)	16 (6.8)	22 (9.4)	33 (14.1)	61 (26.1)	102 (43.6)
Sole (left)	31 (13.2)	30 (12.8)	51 (21.8)	100 (47.2)	15 (6.4)	22 (9.4)	36 (15.4)	56 (23.9)	105 (44.5)

Table 2. The mean scores of stress by the frequency and intensity of pain in different limbs among the office workers of Zahedan University of Medical Sciences, Iran

Assessed limb	Frequency of pain Mean±SD				P	Severity of pain Mean±SD				P	Without pain
	1-2 time a day	1-2 time a week	1-2 time a month	1-2 time a year		Intolerable pain	Severe pain with decreasing in activity	Tolerable pain without decreasing in activity	low		
Neck	95.67 ± 13.60	100.84 ± 15.82	95.98 ± 11.77	93.35 ± 13.18	0.020	97.31 ± 15.16	101.33 ± 16.45	95.67 ± 14.00	94.60 ± 12.12	0.091	92.52 ± 14.32
Upper back	17.20 ± 105.50	95.65 ± 12.92	96.54 ± 12.73	94.62 ± 13.71	0.010	104.50 ± 13.82	102.57 ± 12.41	96.43 ± 14.40	94.11 ± 12.46	0.002	91.81 ± 13.32
Middle back	95.42 ± 15.24	103.50 ± 14.01	95.25 ± 11.62	96.03 ± 14.77	0.003	103.00 ± 20.81	101.57 ± 16.39	97.21 ± 12.90	94.66 ± 12.38	0.012	92.21 ± 13.59
Lower back	101.04 ± 14.87	95.63 ± 9.68	96.54 ± 15.72	92.41 ± 11.73	0.0120	102.12 ± 15.39	96.48 ± 16.39	97.91 ± 14.62	93.32 ± 10.81	0.072	93.16 ± 13.79
Shoulder (right)	97.26 ± 13.68	13.36 ± 97.09	96.23 ± 14.41	97.28 ± 14.33	0.170	100.73 ± 19.26	97.06 ± 13.21	97.06 ± 13.34	97.03 ± 12.03	0.050	91.70 ± 14.04
Shoulder (left)	99.77 ± 16.97	96.41 ± 10.75	95.85 ± 12.14	99.86 ± 15.09	0.022	99.80 ± 16.47	98.44 ± 17.12	95.71 ± 11.24	99.31 ± 13.82	0.019	92.02 ± 13.58
Arm (right)	101.41 ± 16.65	95.33 ± 11.16	94.94 ± 9.45	96.88 ± 15.74	0.290	95.50 ± 15.34	99.58 ± 12.67	94.32 ± 12.9	97.17 ± 14.67	0.462	94.12 ± 14.11
Arm (left)	97.63 ± 17.18	98.21 ± 12.66	97.56 ± 10.94	96.09 ± 15.37	0.482	103.5 ± 15.09	95.07 ± 11.23	96.34 ± 13.00	96.63 ± 15.16	0.327	94.14 ± 13.82
Elbow (right)	95.56 ± 10.10	99.12 ± 13.90	95.83 ± 10.95	95.47 ± 14.57	0.872	95.58 ± 9.97	92.71 ± 11.51	102.54 ± 12.64	94.49 ± 13.45	0.141	94.58 ± 14.98
Elbow (right)	104.27 ± 12.93	98.75 ± 7.43	97.10 ± 10.08	95.98 ± 13.02	0.146	102.69 ± 13.35	97.66 ± 8.13	96.17 ± 11.52	95.96 ± 13.35	0.327	94.30 ± 15.03
Forearm (right)	98.18 ± 10.70	97.50 ± 11.62	96.80 ± 14.7	94.93 ± 13.77	0.870	96.20 ± 10.19	102.00 ± 12.64	99.95 ± 13.18	94.81 ± 13.44	0.221	94.35 ± 14.85
Forearm (left)	104.25 ± 7.50	61.94 ± 10.12	99.19 ± 12.94	95.62 ± 13.11	0.448	98.83 ± 14.94	95.71 ± 10.24	99.38 ± 12.15	95.63 ± 13.46	0.726	94.78 ± 14.78
Wrist (right)	99.42 ± 13.22	13.37 ± 100.79	95.07 ± 11.34	94.97 ± 13.5	0.028	103.56 ± 15.81	100.73 ± 14.01	97.52 ± 10.33	93.33 ± 13.02	0.004	92.76 ± 15.1
Wrist (left)	104.38 ± 12.43	99.92 ± 11.48	97.48 ± 12.8	94.58 ± 12.65	0.022	105.93 ± 14.55	98.42 ± 13.27	99.90 ± 10.25	94.36 ± 12.78	0.004	93.19 ± 14.94
Palm (right)	97.84 ± 9.09	98.22 ± 10.38	100.40 ± 14.47	96.35 ± 12.79	0.348	101.80 ± 13.24	99.15 ± 10.01	98.50 ± 12.2	96.04 ± 13.75	0.290	94.05 ± 14.74
Palm (left)	98.00 ± 7.24	98.155 ± 11.5	106.4 ± 16.2	95.44 ± 11.96	0.102	100.75 ± 8.63	100.00 ± 15.88	98.84 ± 15.02	95.52 ± 12.92	0.483	94.56 ± 14.61
Fingers (right)	99.69 ± 15.40	97.25 ± 12.42	99.14 ± 15.51	94.56 ± 12.96	0.112	98.06 ± 13.55	99.54 ± 15.34	99.80 ± 15.68	93.21 ± 11.52	0.071	93.93 ± 14.2
Fingers (left)	12.29 ± 101.38	93.38 ± 11.89	98.50 ± 14.77	95.60 ± 12.52	0.349	103.40 ± 12.92	96.78 ± 12.37	98.52 ± 16.34	95.22 ± 12.24	0.267	94.27 ± 14.78
Buttock (right)	94.61 ± 10.18	94.16 ± 15.49	98.30 ± 13.26	97.36 ± 12.74	0.537	99.40 ± 9.33	98.78 ± 10.63	94.80 ± 10.89	97.43 ± 14.04	0.364	93.93 ± 14.91
Buttock (left)	98.31 ± 12.51	96.81 ± 18.27	94.10 ± 14.63	96.92 ± 11.98	0.669	101.00 ± 9.47	102.78 ± 13.95	96.33 ± 13.75	96.59 ± 13.45	0.160	93.80 ± 14.63
Thigh (right)	99.38 ± 13.25	95.43 ± 14.76	98.44 ± 11.45	95.94 ± 13.65	0.505	105.08 ± 17.02	94.91 ± 8.16	98.57 ± 12.87	95.03 ± 13.44	0.094	94.23 ± 14.54
Thigh (left)	100.25 ± 13.26	97.80 ± 12.47	97.95 ± 10.44	94.50 ± 12.32	0.514	106.25 ± 14.03	97.46 ± 9.54	96.54 ± 11.69	94.06 ± 12.78	0.079	94.46 ± 15.11
Knee (right)	94.69 ± 12.16	99.33 ± 13.52	96.04 ± 13.63	96.25 ± 12.91	0.352	98.56 ± 15.32	94.78 ± 10.82	95.47 ± 11.15	97.04 ± 12.30	0.548	93.95 ± 15.29
Knee (left)	95.51 ± 15.39	99.71 ± 14.33	96.29 ± 12.22	96.36 ± 12.85	0.142	100.4 ± 15.8	95.67 ± 13.30	94.86 ± 13.80	97.65 ± 13.22	0.295	93.62 ± 14.51
Leg (right)	100.56 ± 13.89	96.08 ± 10.40	95.29 ± 15.27	96.34 ± 11.41	0.557	103.00 ± 16.63	96.77 ± 10.56	96.34 ± 15.19	95.77 ± 11.55	0.509	94.37 ± 15.29
Leg (left)	98.17 ± 15.03	97.30 ± 10.91	94.81 ± 15.23	96.71 ± 11.35	0.723	101.18 ± 16.38	100.11 ± 12.51	90.91 ± 13.69	96.49 ± 11.68	0.136	94.66 ± 15.01
Talus-ankle (right)	96.06 ± 11.71	96.57 ± 10.81	96.67 ± 17.45	97.68 ± 14.19	0.496	99.33 ± 11.59	100.74 ± 13.19	93.90 ± 13.64	96.73 ± 13.27	0.335	94.31 ± 14.76
Talus-ankle (left)	95.07 ± 12.01	95.47 ± 10.56	97.57 ± 15.22	95.74 ± 13.89	0.939	99.25 ± 12.79	100.39 ± 15.89	93.93 ± 12.33	98.77 ± 14.19	0.492	94.82 ± 14.29
Sole (right)	99.75 ± 14.27	95.51 ± 12.39	101.35 ± 16.68	95.00 ± 12.13	0.054	99.00 ± 12.14	98.36 ± 17.04	97.33 ± 15.53	95.67 ± 12.07	0.378	93.64 ± 14.28
Sole (left)	99.00 ± 15.83	95.87 ± 12.61	98.96 ± 15.34	95.17 ± 12.18	0.313	98.06 ± 14.03	101.82 ± 16.30	94.41 ± 13.61	95.57 ± 12.64	0.192	94.15 ± 14.34

SD: Standard deviation

Such effects can, in fact, be caused by other psychological and physiological factors which are independent of the demographic variables examined in this study. Therefore, further investigations are required in this field.

Job stress is considered as a risk factor for musculoskeletal disorders in upper limbs. In the current research, job stress was significantly associated with pain in the upper limbs. However, no such an association was present in the case of pain in the lower limbs. The high prevalence of musculoskeletal disorders in the upper limbs and their low prevalence in the lower limbs might have been responsible for this difference. Nevertheless, since the effects of individual and psychological characteristics on the incidence of musculoskeletal disorders are complicated by workplace characteristics, further research is warranted to clarify such effects (35). However, the results of previous studies on the relationship between stress and musculoskeletal disorders of the upper limbs are consistent with our findings (36,37). Haukka et al. (17) confirmed that there is a close relationship between stress and musculoskeletal disorders, and they showed this relationship is permanent in upper limbs. Livshits et al. (38) reported a higher incidence of low back pain in individuals with stress and depression. Although they showed that there is no relationship between stress and other part of body segments.

According to Karasek's Job Demand Control Model, comprising psychological job demands, decision latitude, and social support at work (39), most of our participants had passive jobs (low demand, low control, and low social support). This situation is a neutral state from the macroergonomic perspective. In other words, since these individuals had a low level of stress, their job demands could not significantly affect the incidence of musculoskeletal disorders among them.

Our findings indicated the high prevalence of musculoskeletal disorders among the studied office workers. While the prevalence of the disorders was over 50% in specific body parts of the participants, the prevalence of pain and disorders was < 20% in most cases. Since the mean work experience of the subjects was almost low in this study, the chronic nature of these disorders may result in their higher prevalence with increased work experience in the future (40). Hence, stress reduction and posture correction may decrease the risk of musculoskeletal disorders and postpone their incidence.

Finally, given the significant relationship between stress and pain in the upper limbs, the mentioned university needs to pay more attention to its staff's mental health problems and train its staff on adopting proper ergonomic postures while working. Such strategies will help reduce, modify, or eliminate factors involved in the incidence of stress and musculoskeletal disorders.

Although musculoskeletal disorders have significant relationships with some demographic variables, such as age, work experience, and marital status, these variables showed no significant relationship with job stress. It seems that factors associated with musculoskeletal disorders can be independent of those affecting stress. However, job stress can be a determinant of the incidence of musculoskeletal disorders, especially in the upper limbs. Therefore, stress reduction programs are required to not only reduce the incidence of physiological diseases, but also minimize the development of musculoskeletal disorders and pain and increase the efficiency of the staff. These programs may involve psychology courses and motivate the staff to better communicate with their colleagues and clients at the workplace. Furthermore, based on the principles of ergonomics and cooperative psychology, interactions between staff members help them share their ideas and can be effective in reducing stress and musculoskeletal disorders.

Less collaboration of some staffs in filling

and completing and referring the questionnaires was a minor limitation of this study. However, it was tried to contact the subjects and explain them regarding objectives and the importance of the study to complete the questionnaires. On the other hand, this study has been designed cross-sectional**;** therefore**,** their might be some confounding factors that could be affect the result of **the** study. Hence, it is recommended to conduct the prospective studies in this field.

Conflict of Interests

The Authors have no conflict of interest.

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