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MUSCULOSKELETAL SYSTEM DISCOMFORT AND RISK FACTORS OF BANK EMPLOYEES

Berna ÇAĞLA ÇAĞLAYAN[1], 0000-0002-2559-9756,
Bilge BAŞAKCI ÇALIK[2], 0000-0002-7267-7622
Elif GÜR KABUL[3], 0000-0003-3209-1499
Nesrin YAĞCI[4], 0000-0002-5669-4932

[1] MSc, PT, Pamukkale University, School of Physical Therapy and Rehabilitation, Denizli, TURKEY
[2]Assoc Prof. Dr., Pamukkale University, School of Physical Therapy and Rehabilitation, Denizli, TURKEY
[3] MSc, PT, Research Assistant, Pamukkale University, School of Physical Therapy and Rehabilitation, Denizli, TURKEY
[4]Prof. Dr., Pamukkale University, School of Physical Therapy and Rehabilitation, Denizli, TURKEY

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Correspondence: *Berna Çağla Çağlayan, E-mail: ptcaglacaglayan@gmail.com*

ABSTRACT

Musculoskeletal disorders are a common problem in the working population. Previous studies have demonstrated various risk factors play a role in the development of work-related musculoskeletal disorders. The aim of this study is to analyze the prevalence of musculoskeletal discomfort, the effect of this situation on work interference and to identify personal and work-related factors in bank employees. A cross sectional study was conducted and 101 volunteer bank employees (69 women, 32 men) were included in the study. Demographic data of individuals, working time in sitting position and exercise habits were recorded. Prevalence of musculoskeletal system disorders and work interference were evaluated with Cornell Musculoskeletal Discomfort Questionnaire (CMDQ). Participants were divided into 2 groups as " ≤32 years" and ">32 years" in terms of age; " ≤8 hours" and ">8 hours" in terms of sitting time; " ≤7 years" and ">7 years" in terms of working time. Exercise habits were recorded as "yes" and "no". Chi-square test and Mann-Whitney U test were used to analyze the data. It was determined that the most common discomfort occurred in the neck (75.2%), right shoulder (52.5%), back (76.2%) and low back (68.3%) regions from 20 regions, which evaluated with CMDQ, in bank employees. Work interference related with the discomfort in these regions were respectively; 40.6%, 24.8%, 34.7% and 28.7%. When possible risk factors were examined as for these four regions with the most discomfort, it was seen that female gender was occurred risk factor by 2.58 times (p=0.043) in neck and 3.63 times (p=0.004) in right shoulder, while working for more than 8 hours in sitting position was occurred risk factor by 0.32 times (p=0.05) in low back. It was also determined that regular exercise reduced musculoskeletal disorders in the neck by 0.32 times (p = 0.05). When the total score of CMDQ and personal and work-related risk factors were compared, it was observed that gender made a difference (p =

0.013).Bank employees mostly complain of discomfort in neck, shoulder, back and low back region. While female gender and working for more than 8 hours in sitting position during the day increase the risk of these complaints, regular exercise can be an effective method to reduce complaints.

Keywords: Musculoskeletal system, risk factors, employee health

BANKA ÇALIŞANLARINDA KAS İSKELET SİSTEMİ RAHATSIZLIKLARI VE RİSK FAKTÖRLERİ

ÖZET

Kas-iskelet sistemi rahatsızlıkları çalışan popülasyonda yaygın bir sorundur. Önceki çalışmalar, işle ilgili kas-iskelet sistemi bozukluklarının gelişiminde çeşitli risk faktörlerinin rol oynadığını göstermiştir. Bu çalışmanın amacı, banka çalışanlarında kas-iskelet rahatsızlıklarının yaygınlığını, bu durumun işin engellenmesine etkisini incelemek ve kişisel ve işle ilgili faktörleri belirlemektir. Kesitsel bir çalışma yapıldı ve çalışmaya 101 gönüllü banka çalışanı (69 kadın, 32 erkek) dahil edildi. Bireylerin demografik bilgileri, oturarak çalışma süreleri ve egzersiz alışkanlıkları kaydedildi. Kas iskelet sistemi rahatsızlıklarının sıklığı ve işin engellenmesi Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) ile değerlendirildi. Katılımcılar, yaş açısından "≤32 yıl" ve ">32 yıl" olarak; oturarak çalışma süresi açısından "≤8 saat" ve ">8 saat" olarak; çalışma süresi açısından "≤7 yıl" ve ">7 yıl" olarak 2 gruba ayrıldı. Egzersiz alışkanlığı, "evet" ve "hayır" olarak kaydedildi. Verilerin analizinde Ki-kare testi ve Mann- Whitney U testi kullanıldı. Banka çalışanlarında CMDQ ile değerlendirilen 20 bölgeden, en sık boyun (%75,2), sağ omuz (%52,5), sırt (%76,2) ve bel (%68,3) bölgelerinde rahatsızlık olduğu belirlendi. Bu bölgeler için işin engellenmesi sırasıyla; %40,6, %24,8, %34,7 ve %28,7 idi. En fazla rahatsızlık görülen bu dört bölge için olası risk faktörleri incelendiğinde; kadın cinsiyet boyunda 2.58 kat (p=0.043) ve sağ omuzda 3.63 kat (p=0.004) risk oluştururken; 8 saatten fazla oturarak çalışmak belde 0.32 kat (p=0.05) risk oluşturduğu görüldü. Ayrıca düzenli egzersizin boyundaki kas iskelet sistemi rahatsızlıklarını 0.32 kat (p=0.05) azalttığı belirlendi. CMDQ'nun toplam ağırlık puanı ile kişisel ve işe bağlı risk faktörleri karşılaştırıldığında ise cinsiyetin fark oluşturduğu görüldü (p=0.013). Banka çalışanları en sık boyun, omuz, sırt ve bel bölgelerindeki rahatsızlıktan yakınmaktadırlar. Kadın cinsiyet ve gün içinde 8 saatten fazla oturarak çalışmak bu yakınmalardaki riski arttırırken, düzenli egzersiz yakınmaları azaltmada etkili bir yöntem olabilir.

Anahtar kelimeler: Kas iskelet sistemi, risk faktörleri, çalışan sağlığı

INTRODUCTION

Musculoskeletal disorders (MSD), which include inflammatory or degenerative conditions affecting the muscles, joints, tendons, ligaments, nerves and vessels in the body, have been observed commonly in working population [1].

The impaired relationship between physical requirements of the work and physical capacity of the person lead to occur work-related musculoskeletal disorders. These conditions may also result in pain and functional disability [2]. Work-related MSD reduce productivity due to some reasons such as rest leave, work interference, early retirement and cause economic problems in society [3]. Several personal, physical and psychosocial factors play a role in MSD. These factors may interact with working populations including office workers [4]. Prolonged static sitting and computer usage, repetitive and long-term activities, poor ergonomic workstation are associated with physical factors, while increased work stress, uncertainty in workload and professional future, insufficient support from co-worker and supervisor are associated with

psychosocial factors. Furthermore, previous musculoskeletal complaints, female gender, age, smoking and obesity are personal risk factors of MSD [4-6].

In literature, Yu and Wong reported that more than 30% of bank employees complained about neck and back pain and 15% of them had shoulder and hand-wrist problem [7]. Many studies stated that prevalence of MSD have been high in different body regions of office workers [8-12]. Prolonged static sitting in office workers makes them sensitive to occur MSD. Accordingly, Rezaee et al. [13] showed that working more than 4 hours in sitting position was related to MSD in office workers. In a study with World Bank employees have been found that neck, shoulder, hand and wrist disorders were associated with using computer for more than 7 hours and fewer breaks [14].

Although there are some studies analyzing prevalence and risk factors of MSD among bank employees in different countries, no previous study with this group in our country. This study was aimed for analyzing the prevalence of musculoskeletal disorders and effect of this situation on work interference and personal and work-related risk factors in bank employees.

MATERIALS AND METHODS

Participants

At first, the study included 108 bank employees working at different banks in Turkey. All participants were bank employees. Those who had a history of the rheumatologic, surgery or chronic disease related pain, did not want to participate and incomplete the questionnaire were excluded from the study. Two employees having no time, two employees having surgery pain (herniated disc), and three employees who did not fill the evaluation forms completely were excluded from the study. The study was completed with a total of 101 volunteer employees (69 women, 32 men, age mean=33.67 (5.85) years). The study was conducted in accordance with the Helsinki Declaration and informed consent was obtained from all participants. The ethics of the study was approved by the local Ethics Committee at the meeting dated 02.02.2021 and numbered 60116787-020-14232.

Demographic data (age, gender, education, height, weight, body mass index, smoking, alcohol and exercise habits) and work-related data (daily sitting time (hours), working time (years)) of the participants were recorded. Work-related musculoskeletal disorders were evaluated with the Turkish version of Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) (Appendix 1). The evaluation forms are self-report and can be completed in 10-15 minutes.

All evaluation forms and informed consent forms were sent to the participants via e-mail. The completed evaluation forms were requested to be sent to us via e-mail again.

Participants were divided into 2 groups as " ≤32 years" and ">32 years" in terms of age; " ≤8 hours" and ">8 hours" in terms of sitting time; " ≤7 years" and ">7 years" in terms of working time. Exercise habits were recorded as "yes" and "no".

Measures

Cornell Musculoskeletal Discomfort Questionnaire (CMDQ): This questionnaire, developed by Hedge et al, evaluates MSD frequency, severity, and work interference for twenty body parts. On the frequency scale, the frequency of experiencing MSD in the past workweek is rated in 5- point Likert scale (1= never, 2= once or twice, 3= three or four times, 4= once every day, 5= several times every day), On the severity scale, the severity of the experienced MSD is rated in 3-point Likert scale (1= mild, 2= moderate, 3= very) and on the work interference scale, the interference of the experienced MSD with ability to work is rated in 3-point Likert scale (1= not at all, 2=slightly, 3= substantially). Each body region is scored from 0-90. High scores indicate increased MSD. Turkish validity and reliability study was performed by Erdinç et al. [15-17] in 2008. Cronbach's alpha statistics for the frequency, the severity, and the work interference scales were 0.88, 0.89, and 0.88, respectively.

Statistical analysis

The data were analyzed with SPSS (version 21.0) package program. Descriptive statistics are given as mean and standard deviation, nominal variables are given as numbers and percentages. The Chi-Square test was used to assess the statistical difference between the bank employees' body regions in CMDQ and possible risk factors. The odds ratios (OR) and their
%95 confidence intervals (%95 CI) were calculated. Mann-Whitney U test was used to compare the total weight score of CMDQ with personal and work-related risk factors. P value <0.05 was considered statistically significant.

RESULTS

69 women and 32 men with a mean age of 33.67 (5.85) years were included in the study. Personal and work-related data of the individuals are shown in Table 1. According to the CMDQ results, regions of body parts most commonly found were neck (75.2%), right shoulder (52.5%), back (76.2%) and low back (68.3%). Work interference related with the discomfort in these regions were 40.6%, 24.8%, 34.7% and 28.7%, respectively (Table 2). These regions (neck, shoulder, back and low back) were examined in terms of personal and work-related risk factors because of high incidence.

Table 1. Personal and work-related characteristics of participants

Variables	
Gender	**n (%)**
Female	69 (%68,3)
Male	32 (%31,7)
Age (years)	
Range	25-52
Median	32
	Mean (SD)
Body Mass Index (kg/m^2)	24,42 (4,2)
Education	**n (%)**
High school	10 (%9,9)
Under-post graduate	91 (%90,1)
Working time (years)	
Range	1-28
Median	7
Sitting time (hours/day)	
Range	4-11
Median	8
Smoking	**n (%)**
Yes	33 (%32,7)
No	68 (%67,3)
Alcohol	**n (%)**
Yes	16 (%15,8)
No	85 (%84,2)
Regular physical activity	**n (%)**
Yes	13 (%12,9)
No	88 (%87,1)

SD: Standard deviation

Table 2. Prevelance of musculoskeletal disorders, work interference and total weight scores

Body Region	Musculoskeletal disorder in the past week		Work interference in the past week		Total weight scores Mean (SD)
	Yes n(%)	No n(%)	Yes n(%)	No n(%)	
Neck	76 (%75,2)	25 (%24,8)	41 (%40,6)	60 (%59,4)	12,53 (19,03)
Right Shoulder	53 (%52,5)	48 (%47,5)	25 (%24,8)	76 (%75,2)	10,66 (19,08)
Back	77 (%76,2)	24 (%23,8)	35 (%34,7)	66 (%65,3)	13,04 (20,53)
Low back	69 (%68,3)	32 (%31,7)	29 (%28,7)	72 (%71,3)	9,17 (17,43)

SD: Standard deviation

Work-related risk factors

The average working years of the participants was 9.3 (6.3) years. The average working hours of the participants in sitting position during the day was 7.87 (1.31) hours. Possible risk factors were examined as for these four regions with the most discomfort; working more than 8 hours in sitting position was found to occurred risk in low back by 0.32 times (p=0.05). Working years did not pose a risk (p=0.183) (Table 3).

Personal risk factors

Gender: When the four regions with the most discomfort and possible risk factors were analyzed; it was shown that the female gender was occurred risk factor by 2.58 times (p=0.043) in neck and 3.63 times (p=0.004) in right shoulder (Table 3).

Age: When the four regions with the most discomfort and possible risk factors were analyzed; it was shown that age did not pose statistical risk for these regions (p>0.05), (Table 3).

Regular Exercise: When the four regions with the most discomfort and possible risk factors were analyzed; it was shown that regular exercise reduced MSD risk by 0.32 times in neck (p=0.05), (Table 3).

Comparison of CMDQ's total weight score and risk factors

When the total weight score of CMDQ and risk factors (personal and work related) were compared, it was observed that there was statistical difference for female gender (p=0.013), (Table 4).

Table 3: Analyzing of personal and work related risk factors for four body region with musculoskeletal disorder

	Musculoskeletal disorders in the past week									
	Neck		**Right shoulder**		**Left shoulder**		**Back**		**Low back**	
	Yes (%)	**No (%)**	**Yes (%)**	**No (%)**	**Yes (%)**	**No (%)**	**Yes (%)**	**No (%)**	**Yes (%)**	**No (%)**
Gender										
Female	56 (%81,2)	13 (%18,8)	43 (%62,3)	26 (%37,7)	42 (%60,9)	27 (%39,1)	55 (%79,7)	14 (%20,3)	49 (%71)	20 (%29)
Male	20 (%62,5)	12 (%37,5)	10 (%31,2)	22 (%68,8)	14 (%43,8)	18 (%56,2)	22 (%68,8)	10 (%31,2)	20 (%62,5)	12 (%37,5)
OR (95%CI)*	2.585 (1.014-6.591)		3.638 (1.491-8.879)		2.000 (0.855-4.677)		1.786 (0.690-4.619)		1.470 (0.607-3.561)	
p**	**0.043**		**0.004**		0.107		0.229		0.392	
Age										
≤32 years	44 (%75,9)	14 (%24,1)	35 (%60,3)	23 (%39,7)	36 (%62,1)	22 (%37,9)	46 (%79,3)	12 (%20,7)	41 (%70,7)	17 (%29,3)
>32 years	32 (%74,4)	11 (%25,6)	18 (%41,9)	25 (%58,1)	20 (%46,5)	23 (%53,5)	31 (%72,1)	12 (%27,9)	28 (%65,1)	15 (%34,9)

OR	1.080		2.114		1.882		1.484		1.292	
(95%CI)*	(0.434-2.688)		(0.947-4.715)		(0.845-4.189)		(0.591- 3.726)		(0.555-3.006)	
p**	0.868		0.066		0.120		0.399		0.552	
Working time										
≤7 years	42 (%77,8)	12 (%22,2)	32 (%59,3)	22 (%40,7)	34 (%63)	20 (%37)	43 (%79,6)	11 (%20,4)	40 (%74,1)	14 (%25,9)
>7 years	34 (%72,3)	13 (%27,7)	21 (%44,7)	26 (%55,3)	22 (%46,8)	25 (%53,2)	34 (%72,3)	13 (%27,7)	29 (%61,7)	18 (%38,3)
OR	1.338		1.801		1.932		1.495		1.773	
(95%CI)*	(0.541-3.310)		(0.817-3.971)		(0.872-4.281)		(0.595-3.752)		(0.761-4.134)	
p**	0.528		0.143		0.103		0.391		0.183	
Sitting time										
≤8 hr/day	56 (%73,7)	20 (%26,3)	41 (%53,9)	35 (%46,1)	46 (%60,5)	30 (%39,5)	56 (%73,7)	20 (%26,3)	48 (%63,2)	28 (%36,8)
>8 hr/day	20 (%80)	5 (%20)	12 (%48)	13 (%52)	10 (%40)	15 (%60)	21 (%84)	4 (%16)	21 (%84)	4 (%16)
OR	0.700		1.269		2.300		0.533		0.327	
(95%CI)*	(0.232-2.113)		(0.513-3.137)		(0.914-5.788)		(0.163-1.744)		(0.102-1.048)	
p**	0.526		0.605		0.073		0.293		**0.052**	
Regular PA										
Yes	7 (%53,8)	6 (%46,2)	6 (%46,2)	7 (%53,8)	6 (%46,2)	7 (%53,8)	8 (%61,5)	5 (%38,5)	6 (%46,2)	7 (%53,8)
No	69	19	47	41	50	38	69	19	63	25

	(%78,4)	(%21,6)	(%53,4)	(%46,6)	(%56,8)	(%43,2)	(%78,4)	(%21,6)	(%71,6)	(%28,4)
OR (95%CI)*	0.321 (0.096-1.070)		0.748 (0.233-2.405)		0.651 (0.202-2.097)		0.441 (0.129-1.503)		0.340 (0.104-1.112)	
p**	0.055		0.625		0.470		0.182		0.066	

PA: Physical activity

* Odds Ratio **Ki-Kare test

$p<0.05$

Table 4: Comparison of CMDQ's total weight score and risk factors

Risk Factors	**n**	**Total Weight Score Mean (SD)**	**p***
Gender			**0.013**
Female	69	77.11 (79.28)	
Male	32	43.82 (62.91)	
Age			0.770
≤32 years	58	67.06 (75.41)	
>32 years	43	65.9 (77.17)	
Working time			0.380
≤7 years	54	69.78 (75.64)	
>7 years	47	62.87 (76.6)	
Sitting time			0.104
≤8 hr/day	76	59.27 (71.27)	
>8 hr/day	25	88.74 (85.89)	
Regular physical activity			0.318
Yes	13	41.96 (45.99)	
No	88	70.2 (78.78)	

CMDQ: Cornell Musculoskeletal Discomfort Questionnaire

SD: Standard deviation

*Mann- Whitney U Test

$p<0.05$

DISCUSSION

Our study was determined that musculoskeletal symptoms most commonly were occurred in the neck, right shoulder, back and low back regions in bank employees. When the possible risk factors for these four regions were analyzed; the female gender on the neck and right shoulder; working more than 8 hours in sitting position on the low back was found to be a risk factor. In addition, it was determined that regular exercise reduces musculoskeletal disorders in the neck. When the total weight score of CMDQ and risk factors were compared, it was seen that gender made a difference.

There are some studies in the literature that investigate work-related musculoskeletal disorders in individuals working under similar conditions with bank employees.

Studies reported that MSD mostly occurred in neck (55.5%), shoulder (50.7%), elbow / hand (31.5%), back (26.2) and low back (6.6%) for 720 office workers using computers [18]; in low back (55.1%), neck (52.5%) and back (53%) for 528 office workers [11]; in low back (72.4%) and neck (55.2%) for 250 office workers [9]; in neck (60.16%), waist (57.10%) and shoulders (54.03%) for 359 office workers [19]. In addition, Çalık et al. [20] showed that musculoskeletal disorders were most common in the back (69.6%), waist (68.4%), neck (67.1%) and right shoulder (50.6%) in office workers using computers.

It was reported that musculoskeletal disorders were most common in the neck (31.4%), back (30.6%), shoulder (16.5%), elbow and hand (14.9%) and arm (6.6%) regions in a study with bank employees using computers in Hong Kong [7]. According to Akrouf et al [21] neck (53.5%), waist (51.1%), shoulder (49.2%) and back (38.4%) were the most affected regions in bank employees working in Kuwait. However, we did not encounter any study examining the musculoskeletal system problems for bank employees in our country. Our results were similar to other studies. We found that neck (75.2%), right shoulder (52.5%), back (76.2%) and low back (68.3%) regions had high prevalence for musculoskeletal discomfort in bank employees.

MSD may be a big problem for both employers and employees. Further, the presence of musculoskeletal complaints can be an important factor affecting productivity, work interference and retirement as well [22]. In the recent study, it was seen that the neck (40.6%), right shoulder (24.8%), back (34.7%) and low back (28.7%) regions in which MSD mostly occurred played a significant role on work interference.

In the literature, it was observed that the presence of work-related MSD in working population affected work interference [20, 23]. This situation suggests that education and rehabilitation

programs for the determination and prevention of musculoskeletal disorders in individuals may be important in terms of productivity in working populations.

There were some studies showing that female gender was related to MSD in office workers [20, 23-25]. Similarly, in our study was determined that female gender posed a risk for the neck and shoulder regions of MSD. In addition, the statistical difference obtained by comparing the total weight scores of these regions with gender supports these results. Differences of biological and psychosocial factors may play a role in this situation [26]. Erdinç [23] and Çalık et al. [20] reported that younger ages had a risk for back, low back and shoulder, while in some studies, it was stated that age was not a risk factor for musculoskeletal system disorders [27,28]. In the recent study, although the prevalence of MSD was higher for individuals who were younger than 32-year-old in the neck, shoulders, back and low back regions compared to those older than 32- year-old, there was no statistically significant in terms of risk factor.

In the recent study, it is seen that the working years did not create a risk on MSD. However, it is stated in the literature that increased working years were related to fewer musculoskeletal disorders. This situation can be explained by gaining experience and learning self-protection methods [23,29].

The prolonged sitting position has been reported to increase stress on the spine and be harmful for the musculoskeletal system [30, 31]. In the recent study, working in sitting position more than 8 hours during a day for bank employees was a risk for the low back region. Daneshmandi et al. [31] reported that an average of 6.29 hours at work in sitting position resulted in musculoskeletal disorders at shoulder, low back, leg and knee in office workers. Wongwitwichote et al. [32] also reported that as a result of study, low level physical activity and prolonged sitting led to the discomfort of the musculoskeletal system in workers using computer. One of the underlying causes of musculoskeletal disorders is prolonged static posture as long as repetitive movements for office workers [32]. In order to prevent this situation which affects productivity, it would be beneficial to inform of regular breaks, ergonomics and exercises that can be applied while sitting.

There are strong evidences in the literature that regular physical activity has positive effects on cardiovascular diseases and chronic diseases including musculoskeletal disorders [33, 34]. Shakerian et al. [35] found a significant relationship between regular physical activity and discomfort in the low back, wrist and neck in handicraft workers. Morken et al. [36] reported an inverse correlation between physical activity and musculoskeletal disorders in all regions except the elbow, knee and foot for workers in navy. In the recent study, 87.1% of individuals did not exercise regularly. When we analyzed musculoskeletal disorders and risk factors, we found that regular exercise reduced musculoskeletal disorders of neck region by 0.32 times. In the light of all these results, we think that it would be beneficial to encourage sedentary office workers, especially in the risk group, to regular physical activity.

LIMITATION

There is a limitation in this study. A questionnaire-based self-reported survey was used to determine the frequency of MSD. Therefore, the prevalence of MSD among bank employees may be different depends on the various workload and their perception. Future studies using objective assessment of musculoskeletal disorders with larger sample sizes are needed.

CONCLUSION

This study was observed that musculoskeletal system disorders were more common at neck, right shoulder, back and low back in bank employees. Besides, the disorders of these regions have been found to affect productivity and work interference. Working in sitting position more than 8 hours during a day and female gender increases the susceptibility to musculoskeletal disorders. Regular exercise can be an effective method to reduce or prevent musculoskeletal disorders. Furthermore, it may be beneficial that not only bank employees but also all workers who work in prolonged sitting position should receive some education including ergonomics for the workplace, rest breaks, physical exercises and healthy eating habits.

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