Arrival Date: 25.08.2020 | Published Date: 22.10.2020 | 2020, Vol: 5, Issue: 8 | pp: 80-91 | Doi Number: http://dx.doi.org/10.46648/gnj.107

Association between Musculoskeletal System Pain and Sleep Quality in Healthcare Professionals

Sağlık Çalışanlarında Kas İskelet Sistemi Ağrısının Uyku Kalitesi İle İlişkisi

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ABSTRACT

Aim: In this study, the purpose was to determine the level of sleep quality in healthcare employees, and to identify its association with the Musculoskeletal System (MSS) pain.

Method: The study had a cross-sectional design, and was conducted in Kirklareli between April and May 2019 with 408 healthcare employees. The data were collected face-to-face with the help of Personal Information Form, Pittsburgh Sleep Quality Index, and International Physical Activity Survey - Short Form.

Results: A total of 66.4% of participants had poor sleep quality. The MSS pain prevalence of the participants lifelong and current was 93.9%, 72.8%, respectively. The areas with the most pain were the low back (66.7%), neck (50.2%) and shoulder (40.0%) so far. The areas that the most pain was the low back (44.9%), the neck (32.1%) and the shoulder (22.8%) during the study. Significant differences were detected between the sex, age, profession, professional seniority, institution worked, most-frequent working style, on-duty status, working posture, and smoking status and sleep quality($p<0.05$). In Multivariate Logistics Regression Models that were adjusted according to some characteristics, the employees with MSS pain during the study period had a high likelihood of having poor sleep quality was 2.156 times (AOR, 95% CI:1.286; 3.616), and 3.147 times higher in those with neck pain (AOR, 95% CI:1.721; 5.756).

Conclusion: Two-thirds of healthcare employees had poor sleep quality. During the study, three-fourths of the participants had MSS pain. Those with MSS pain and neck pain during the study were found to be more likely to have poor sleep quality. Trainings should be planned for the health promotion of employees, and opportunities should be provided for their participation. Problems that arise from working system should be reduced, and the sensitivity of administrators should be increased.

Keywords: Sleep quality; Musculoskeletal System; Pain; Healthcare employees.

ÖZET

Amaç: Bu araştırmada sağlık çalışanlarında uyku kalitesi düzeyini belirlemek, kas iskelet sistemi (KİS) ağrısı ile ilişkisini saptamak amaçlanmıştır.

Yöntem: Araştırma kesitsel tiptedir. Kırklareli'nde Nisan-Mayıs 2019 tarihleri arasında 408 sağlık çalışanları ile yürütülmüştür. Veriler Kişisel Bilgi Formu, Pittsburgh Uyku Kalitesi İndeksi, Uluslararası Fiziksel Aktivite Anketi-Kısa Form yardımıyla yüz yüze toplanmıştır.

Bulgular: Katılımcıların %66,4'ü kötü uyku kalitesine sahiptir. Katılımcıların şimdiye kadar ve araştırma sırasındaki KİS ağrı prevalansı sırasıyla %93,9, %72,8'dir. En fazla ağrı duyulan bölgeler bel, boyun ve omuzdur. Cinsiyet, yaş, meslek, meslek kıdemi, çalışılan kurum, çoğunlukla çalışma şekli, nöbet tutma durumu, çalışma postürü ve sigara içme durumu ile uyku kalitesi arasında anlamlı farklılık saptanmıştır ($p<0,05$). Bazı özelliklere göre düzeltilen çok değişkenli lojistik regresyon modellerinde, araştırma sırasında KİS ağrısı olan çalışanların kötü uyku kalitesine sahip olma olasılığı 2,156 kat (AOR, %95 GA: 1,286; 3,616), boyun ağrısı olanların 3,147 kat (AOR, %95 GA: 1,721; 5,756) yüksek saptanmıştır.

Sonuç: Sağlık çalışanlarının üçte ikisi kötü uyku kalitesine sahiptir. Araştırma sırasında dörtte üçünde KİS ağrısı saptanmıştır. Araştırma sırasında KİS ağrısı ve boyun ağrısı olanların kötü uyku kalitesine sahip olma olasılığı yüksek saptanmıştır. Çalışanlara

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sağlığın geliştirilmesine yönelik eğitimler planlanmalıdır ve katılımları için olanaklar sağlanmalıdır. Çalışma sisteminden kaynaklanan sorunlar azaltılmalı ve yöneticilerin duyarlılıkları arttırılmalıdır.

Anahtar Kelimeler: Uyku kalitesi; Kas iskelet sistemi; Ağrı; Sağlık çalışanları.

INTRODUCTION

A good quality sleep and healthy life are essential and have a critical importance for wellbeing (WHO, 2004; Buyse, 2014). Sleep health is a multidimensional concept, which can be affected by individual, social and environmental factors in maintaining physical and mental health (Buyse, 2014). Sleep deprivation can cause physical effects like sleepiness, fatigue, and hypertension, and cognitive impairments like impairment of performance or attention and motivation (WHO, 2004; Magnavita-Garbarino, 2017).

Sleep quality is an important indicator that is used to evaluate health and well-being (Hoefelmann et al., 2012). Sleep quality is explained as the efficiency of sleep, and consists of the quality of sleep, sleep latency (delay), sleep duration, habitual sleep effectiveness, sleep disturbance, sleep medication use, and daytime dysfunction components (Ağargün et al., 1996; Buysse et al., 1989). A disorder occurring in these components with subjective and qualitative sides is defined as poor sleep quality (Shim-Kang, 2017). Sleep quality is closely associated with the individual's feeling fit and ready for the day after waking up (Buyse, 2014; Magnavita-Garbarino, 2017). It was shown that working conditions like on-duty or shift system disrupting circadian rhythm in healthcare employees cause poor sleep quality (Magnavita-Garbarino, 2017). Also, it was reported that there is an increase in poor sleep quality in the presence of further age, physical inactivity, smoking, alcohol use, increased chronic diseases and comorbidity (Hoefelmann et al., 2012; Appleton et al., 2018; Berhanu et al., 2018).

The Musculoskeletal System (MSS) is a locomotor system that contains tissues like muscles, bones, joints, tendons and ligaments. MSS diseases affect the working and social lives of people by causing restrictions on pain and abilities (WHO, 2020). Work-related MSS diseases show common symptoms of pain in these diseases and many people with chronic pain, which requires repetitive movements of healthcare employees in non-ergonomic conditions, long-term static working positions, lifting or moving people, prolonged standing or walking, and systemic inflammatory conditions can lead to MSS diseases (EU-OSHA, 2010). In these diseases, pain is a common symptom, and people with chronic pain continue to work (Malmberg-Ceder et al., 2017). The most common MSS pain among healthcare employees was reported in the lower back and neck area (Dilek et al., 2016; Yan et al., 2018; Luan et al., 2018). It was also reported that, in the presence of MSS pain, adults experience problems like insomnia, and when pain decreased, sleep quality increased (Skarpsno et al., 2019; Akodu et al., 2018). These problems, which affect the general health level, social life, family and working life of healthcare employees, reflected in quality of life, are an important public health problem; continuing to persist as occupational health problems like adverse working conditions, low job performance, and absence to work. For these reasons, the purpose was to determine the level of sleep quality in healthcare employees and to determine their relations with MSS pain.

MATERIAL AND METHOD

Study Design and Sample

This cross-sectional study was conducted in Kirklareli City Center between April and May 2019. The universe of the study consisted of healthcare employees in primary and secondary public healthcare organizations in Central District of Kirklareli. The minimum sample size of the study was calculated as 405 ($N = 569$, $p = 0.50$, $\alpha = 0.05$ and $d = 0.05$) in the Epi Info 7.2 program. The study was conducted with 408 people who were physicians, nurses/midwives or healthcare technicians, who did not have a previously diagnosed MSS-related disease, who did not have an accident, injury or surgery that would affect MSS, and who voluntarily accepted to participate in the study between the data collection dates.

Data Collection

The data were collected by the researcher with face-to-face interviews by visiting the institutions during the day, shift or night hours. Also, for healthcare employees who were not contacted during the working hours or shift times at night, the unit manager was informed, and questionnaires were left in their institutions, the institution was visited again in the following days and the questionnaires were collected again. The Personal Information Form, International Physical Activity Questionnaire - Short Form (IPAQ-SF) and Pittsburgh Sleep Quality Index (PSQI) were used as the data collection tools. The questionnaire form was collected by individuals themselves or by the interviewer in about 30 minutes. Informed consent forms were received from the participants.

Personal Information Form

In this from, which was prepared based on the literature (Shim-Kang, 2017; Berhanu et al., 2018; Dilek et al., 2016; Luan et al., 2018; Aktaş et al., 2015; Çetinol-Özvurmaz, 2018; Zamanian et al., 2016), there were questions to question the characteristics of participants regarding socio-demographic, professional and some lifestyle and general health status data.

Pittsburgh Sleep Quality Index

The validity and reliability of the scale, which was developed by Buyse et al. (1989), was conducted by Agargün et al. (1996). The scale, which gives the quantitative measurement of sleep quality, consists of 24 questions, evaluating the quality of sleep in the last four weeks. The first 19 questions of the scale are self-assessment questions, and the last 5 questions are answered by the spouse or a roommate of the individual, and these questions are not included in the calculation. There are seven components of the scale, which are grouped as subjective sleep quality, sleep latency, sleep duration, habitual sleep effectiveness, sleep disorder, sleep medication use, daytime dysfunction. The scores obtained from these components give the total index score. The total index score, which range between 0 and 21, shows poor sleep quality. According to the cut-off point of the scale, the total score of PSQI ≥5 is considered to be poor sleep quality. The index does not indicate whether there is sleep disorders or the prevalence of sleep disorders (Buysse et al., 1989; Ağargün et al., 1996).

International Physical Activity Questionnaire- Short Form

The validity and reliability study of the form, which was developed by Craig et al. (2003) to determine the level of physical activity, was conducted by Öztürk (2005). It provides data about severe activity, moderate physical activity, walking and sitting time in the last seven days. The energy needed for activities is calculated as kilocalories for a person with a value of "MET-minute" and MET (Metabolic Equivalent) of 60 kg. In this respect, standard MET values are 3.3 MET for walking, 4.0 MET for moderate physical activity, 8.0 MET for severe physical activity, and 1.5 MET for sitting. The MET values obtained according to physical activity, duration of activity, and number of days in which the activity was performed is multiplied, and the activity-specific MET-min/week score is obtained. Walking, moderate intensity physical activity, and severe physical activity MET-min/week scores are added together, and the total score is obtained. According to the cut-off points <600 MET-min/week is physically inactive, 600-3000 MET-min/week is classified as low level physical activity, and <3000 MET-min/week is classified as adequate physical activity (Craig et al., 2003; Öztürk, 2005).

Study Variables

The dependent variable of the study was the level of sleep quality. Questions determining socio-demographic, professional, some lifestyle and general health characteristics were the independent variables. Among these, sex, age, educational status, occupation, seizure status, smoking status, tea/coffee consumption, and chronic or systemic disease presence were used as covariate variables.

Study Analyses

The numbers (n), percentages (%), mean, and standard deviation (SD) values from descriptive tests were used in the analyses. The Pearson Chi-Square Test and Fisher's Exact Chi-Square Test were used for the comparisons of the rates in independent groups. The difference obtained for multiple layouts was used in Post-Hoc Tests for Chi-Square when it was found statistically significant, and adjusted were made according to the Bonferroni Method for *p*-values. Multi-Variable Logistics Regression Analysis was used for further analysis, and the explanation of the models was shown with Nagelkerke R^2. The analysis was performed using the Statistical Package for the Social Sciences, version 22.0 (SPSS Inc., Chicago, IL, USA).

Ethic Approval

The Approval of the Ethics Committee of the Institute of Health Sciences of Kirklareli University was obtained for the study (12/03/2019 - P0124R00). Official permission was obtained from the Provincial Health Directorate of Kirklareli (04/04/2019- 48254791-605.01) for the study to be conducted.

RESULTS

The mean age was 36.96±9.88 (Min:19, Max: 69) of 68.9% of healthcare employees were women, and 51.7% were undergraduates. A total of 42.4% of employees were physically inactive; and 66.4% of participants had poor sleep quality. The sociodemographic, professional and identifying characteristics according to some lifestyle characteristics of the participants are given in Table 1.

In Table 2, the distribution of the prevalence of MSS pain lifelong and current prevalence was given. The MSS pain prevalence of the participants lifelong was 93.9%. The areas with the most pain were the low back (66.7%), neck (50.2%) and shoulder (40.0%) so far. The MSS current pain prevalence of the participants was 72.8%. The areas that had the most pain scores commonly during the study were the low back (44.9%), the neck (32.1%) and the shoulder (22.8%).

Table 1. Distribution of the descriptive characteristics of the participants (n=408).

Variables	n	%
Sex		
Female	281	68.9
Male	127	31.1
Age (year)		
< 35	182	44.6
≥ 35	226	55.4
Educational status		
High school and associate degree	100	24.5
Undergraduate	211	51.7
Master and doctorate	97	23.8
Occupation		
Specialist physician	42	10.3
General practitioner	30	7.4
Nurse / Midwife	257	63.0
Healthcare technicians	79	19.4
Professional seniority (year)		
< 10	173	42.4
≥ 10	235	57.6
Institutions of employment		
Primary healthcare	99	24.3
Secondary healthcare	309	75.7
Mostly working status		
Daytime	247	60.5
Shifts	134	32.8
Night shifts	27	6.6
Number of seizures (per month)		
0	163	40.0
1-4	79	19.4
≥ 5	166	40.7
The most frequently exposed working posture		
By staying up for a long time	228	55.9
More seated / desk jobs, administrative tasks	130	31.9
Jobs that require staying in the same position for a long time, such as bending, reaching out	48	11.8
Other postures	2	0.5
Smoking		
No	226	55.4
Current smoker	158	38.7
Previous smoker	24	5.9
Frequency of alcohol use		
Never	211	51.7
A few times a month	145	35.5
A few times a week	52	12.7
BMI (kg/m^2)		
Underweight or normal	218	53.4
Overweight	142	34.8
Obesity	48	11.8
Chronic or systemic disease presence		
No	322	78.9
Yes	86	21.1
Physical activity level (MET- min/week)		
Adequate (>3000)	49	12.0
Low (600-3000)	186	45.6
Inactive (<600)	173	42.4
Sleep quality (PSQI)		
Good (< 5)	137	33.6
Poor (≥ 5)	271	66.4
	Mean ± SD	**Min.-Max.**
Water consumption (liter / per day)		
Female	1.55±0.70	0.00-4.00
Male	1.40±0.77	0.20-4.00
Tea/coffee consumption (liter / per day)		
Female	0.86±0.52	0.20-4.00
Male	1.05±0.77	0.20-5.00

The comparison of the descriptive features of the participants in terms of sleep quality was shown in Table 3. In women, those who were under 35 years of age, nurses/midwives and healthcare technicians, those with less than 10 years of professional seniority, those who worked in secondary healthcare organizations, who worked mostly in the form of shifts or night shifts, and who worked in positions that required long standing and bending, and long term stay in the same position, and in those who smoked, there was poor sleep quality compared to other categories of variables ($p<0.05$). No statistically significant differences were detected in terms of educational status, alcohol use frequency, water consumption, tea/coffee consumption, physical activity level, Body Mass Index (BMI), chronic or systemic disease presence, and sleep quality ($p>0.05$).

Table 4 shows the comparison of the sleep quality levels of the participants according to the areas of pain in the musculoskeletal system during the study. The healthcare employees with MSS pain, low back pain, neck pain, shoulder pain, knee pain and ankle pain were found to have more poor sleep quality during the study ($p<0.05$).

The multivariate logistic models that were created by using the Enter Method are presented for the level of sleep quality of the participants in Tables 5 and 6. The explanation and description of the models of the study adjusted for sex, age, educational status, occupation, seizure status, smoking status, daily tea/coffee consumption, and chronic or systemic disease presence was 23.4% and 30.0%, respectively according to Nagelkerke R^2. It was found that the employees with MSS pain during the study had a high likelihood of having poor sleep quality by 2.156-fold in the adjusted model presented in Table 5 (AOR, 95% CI: 1.286; 3.616).

In the adjusted model given in Table 6, it was found that those who did not have neck pain during the study had a high likelihood of having poor sleep quality by 3.147-fold (AOR, 95% CI: 1.721; 5.756) compared to those who did not have neck pain during the study. No statistically significant differences were found between the pains mentioned in other areas and the level of sleep quality ($p>0.05$).

DISCUSSION

It was determined in the questionnaire made with 408 physicians, nurses/ midwives, healthcare technicians who worked in primary and secondary public healthcare organizations in Kirklareli Central District that two-thirds of the employees had poor sleep quality. The impaired sleep quality frequency was reported to be between 20.6% and 65.4% in community-based studies (Berhanu et al., 2018; Aktaş et al., 2015; Zhang et al., 2017), and between 70.97% and 89.7% in studies conducted in healthcare employees (Çetinol-Özvurmaz, 2018; Zamanian et al., 2016; Günaydın, 2014). It was considered that this finding, which was observed to be at a high level in the society and which supports the literature, might be because of the fact that women made up the two-thirds of our participants and there was duty/shift system, which disrupted the circadian rhythm. It was reported that postmenopausal symptoms in women and gender roles, circadian rhythm changes, and chronic diseases and comorbidities with advancing age deteriorated sleep quality Hoefelmann et al., 2012; Shim-Kang, 2017; Appleton et al., 2018; Akodu et al., 2018; Moudi et al., 2018). In the study, high prevalence was detected in women, and poor sleep quality was found in those younger than 35 years of age, which was associated with longer shifts and on-duty numbers of those at a young age. As a matter of fact, nurses/midwives and healthcare technicians, those with less than 10 years of professional seniority, employees in secondary healthcare organizations, who worked mostly in the form of shifts or night shifts, worked for longer terms standing and in jobs requiring staying in the same position had higher sleep quality prevalence. In a study consisting of healthcare employees in Iran, which supports our results, reported that approximately half of those who had shifts were reported to have poor sleep quality (Ghalichi et al., 2013). It was found in the study of Günaydın (2014) that the shift system had a bad effect on the sleep quality of nurses. Karakaş et al. (2017) conducted a study on nurses at hospital showed that the change in working hours, night shifts and more than 40 hours of work was associated with poor sleep quality. Studies showed that poor sleep quality were associated with the level of education (Shim-Kang, 2017; Zhang et al., 2017). Differently in this study, it was found that the poor sleep quality prevalence was higher in those with lower associate and lower education levels, and there were no differences between the quality of sleep. This situation may have been caused by healthcare employees working under the same conditions and similar exposures regardless of the educational status.

It was reported that nicotine deprivation symptoms caused short sleep times and sleep delay, and may cause strength in falling asleep due to respiratory problems in the literature (Ehlers et al., 2017). In this result, which supports the literature, it was found that smokers have statistically significant poor sleep quality levels compared to non-smokers (Moudi et al., 2018). Although alcohol has a sedative duty, which interacts with many neurotransmitter systems, which are important in sleep regulation, decreases were detected in REM in EEG activities of alcohol users (Colrain et al., 2014; Ebrahim et al., 2013). Despite this, which affects sleep quality, no statistical differences were detected between the frequency of alcohol use and sleep quality in our study, which may be due to the consumption of alcohol at a culturally low level observed in our country.

Table 2. Lifelong and current MSS pain prevalence of the participants (n=408).

	Lifelong pain		Current pain	
Pain area	**n**	**%**	**n**	**%**
MSS				
No	25	6.1	111	27.2
Yes	383	93.9	297	72.8
Low back				
No	136	33.3	225	55.1
Yes	272	66.7	183	44.9
Neck				
No	203	49.8	277	67.9
Yes	205	50.2	131	32.1
Shoulder				
No	245	60.0	315	77.2
Yes	163	40.0	93	22.8
Elbow				
No	392	96.1	401	98.3
Yes	16	3.9	7	1.7
Wrist				
No	351	86.0	384	94.1
Yes	57	14.0	24	5.9
Finger				
No	388	95.1	398	97.5
Yes	20	4.9	10	2.5
Hip				
No	358	87.7	386	94.6
Yes	50	12.3	22	5.4
Knee				
No	300	73.5	342	83.8
Yes	108	26.5	66	16.2
Ankle				
No	316	77.5	346	84.8
Yes	92	22.5	62	15.2
Toe				
No	391	95.8	398	97.5
Yes	17	4.2	10	2.5

It was reported that physical activity significantly affected sleep quality (Appleton et al., 2018; Moudi et al., 2018). It was reported in one study that high levels of occupational physical activity in MSS employees and high levels of leisure physical activity increase the prevalence of insomnia symptoms (Skarpsno et al., 2019). Obesity, which is the result of low physical activity levels, is also defined as the risk factor of poor sleep quality (Berhanu et al., 2018). Positive correlation was reported between high sleep durations and BMI (Shim-Kang, 2017); and poor sleep quality increased with BMI increase (Aktaş et al., 2015; Muñoz-Pareja e al., 2016). Our results, which were found to be different from the literature, suggested that larger sampling should be examined because of the very low rate of those who are obese and who do adequate physical activity in our group.

Although the musculoskeletal disease prevalence varies according to age and diagnosis, 20-33% of people experience a painful musculoskeletal condition worldwide (WHO, 2020). In the study, nearly three of four people experienced MSS pain at least once during their lifetimes. The areas with the most pain were found as the low back, neck and shoulder so far and during the study. When studies conducted with healthcare employees were examined in the literature, it was reported that the frequency varied between 22%-89.0% in doctors and nurses (Dilek et al., 2016; Alleblas et al., 2017; Ribeiro et al., 2017). In China, lifelong MSS pain in nurses was found to be in the low back area (64.8%), neck (61.8%), and shoulder (52.3%) (Yan et al., 2018). It was found that nurses working in Vietnam experienced the most pain in the low back (44.4%), and neck (44.1%) area during the last 7 days (Luan et al., 2018). Neck pain (10.0%), low back pain (11.7%), and shoulder pain (5.0%) were reported according to MSS regions in a study conducted on doctors (Dilek et al., 2016). It was observed that the frequency in the MSS regions, which can vary according to professional groups and the units worked in, was generally compatible with the literature. Also, it was found that those with MSS pain and neck pain had poor sleep quality during the study. In a study conducted in Nigeria, it was found that there was a significant reduction in disability by reducing pain; and sleep quality, depression and anxiety levels improved after the intervention in the group with pain (Akodu et al., 2018). A study conducted in Norway also reported that the risk of insomnia increased in people who reported more than one multiple chronic MSS pains (Skarpsno et al., 2018). Tardov-Poluektov (2018) reported that pain syndromes and sleep disorders had mutual relations. It was found that our finding that the factors like age, chronic health conditions, working in shifts or on-duty, circadian rhythm changes, were

decisive, and it is likely to have a mutual relations, which supported the literature data.

Table 3. Comparison of the sleep quality level of the participants with the descriptive characteristics (n = 408).

Variables	Sleep quality				*p*-value†
	Good (PSQI ≥5)		Poor (PSQI <5)		
	n	%	n	%	
Sex					
Female	84	29.9	197	70.1	0.019
Male	53	41.7	74	58.3	
Age (year)					
< 35	42	23.1	140	76.9	<0.001
≥ 35	95	42.0	131	58.0	
Educational status					
Undergraduate or higher	110	35.7	198	64.3	0.109
Associate degree or lower	27	27.0	73	73.0	
Occupation					
Physician	43	59.7_a	29	40.3_b	<0.001
Nurse / Midwife	71	27.6_c	186	72.4_d	c= e< a
Healthcare technicians	23	29.1_e	56	70.9_f	b<d=f
Professional seniority (year)					
< 10	45	26.0	128	74.0	0.005
≥ 10	92	39.1	143	60.9	
Institutions of employment					
Primary healthcare	48	48.5	51	51.5	<0.001
Secondary healthcare	89	28.8	220	71.2	
Mostly working status					
Daytime	104	42.1	143	57.9	<0.001
Shifts or Night shifts	33	20.5	128	79.5	
Seizure status					
No	73	44.8	90	55.2	<0.001
Yes	64	26.1	181	73.9	
The most frequently exposed working posture					
By staying up for a long time	68	29.8_a	160	70.2_b	0.002
More seated / desk jobs, administrative tasks	59	44.7_c	73	55.3_d	c>a=e
Jobs that require staying in the same position for a long time, such as bending, reaching out	10	20.8_e	38	79.2_f	d<b=f
Smoking					
No	91	40.3_a	135	59.7^b	0.004
Previous smoker	8	33.3_c	16	66.7_d	a>e; b<f
Current smoker	38	24.1_e	120	75.9_f	
Frequency of alcohol use					
Never	72	34.1	139	65.9	0.063
A few times a month	41	28.3	104	71.7	
A few times a week	24	46.2	28	53.8	
Water consumption (liter / per day)					
≥ 1.5	61	31.0	136	69.0	0.280
< 1.5	76	36.0	135	64.0	
Tea/coffee consumption (liter / per day)					
< 0.8	60	38.7	95	61.3	0.086
≥ 0.8	77	30.4	176	69.6	
Physical activity level (MET- min/week)					
Adequate (>3000)	67	30.7	151	69.3	0.109
Low (600-3000)	57	40.1	85	59.9	
Inactive (<600)	13	27.1	35	72.9	
BMI (kg/m^2)					
Underweight or normal	67	30.7	151	69.3	0.641
Overweight	57	40.1	85	59.9	
Obesity	13	27.1	35	72.9	
Chronic or systemic disease presence					
No	112	34.8	210	65.2	0.319
Yes	25	29.1	61	70.9	

†Pearson Chi-square Test.

Study strength

The fact that the results can be generalized to the universe is a powerful aspect of the present study.

Limitation

The cause and effect relation stemming from the study design should be carefully interpreted. Because of the intensity of work of healthcare employees, the problem of participation was faced in the study. Retrospective responses like KIS pain information might have been affected by the memory factor.

CONCLUSIONS

It was found that two-thirds of the healthcare employees had poor sleep quality. Approximately two-fifths of the participants were physically inactive. It was also found that poor sleep quality prevalence was higher in women, those under the age of 35, nurses/midwives and healthcare technicians, those with less than 10 years of professional seniority, those who work in second-line healthcare organizations, who worked mostly in the form of shifts or night shifts, those who often had long standing and works that required long stays in the same position, such as bending, and those who were smokers compared to other categories of variables. It was found that nearly all healthcare employees experienced MSS pain at least once in their lifetimes, and about three in four people had MSS pain during the study. The areas with most pain so far and during the study were the low back, neck and shoulders, and it was found that the probability of having poor sleep quality was higher in those with MSS pain and neck pain during the study.

Employees should be given periodic trainings on healthy sleep, prevention of MSS diseases, ergonomic risks, ways of prevention; and their awareness should be increased. Encouraging social and corporate systems must be developed on adequate physical activity, high quality sleep, ergonomic posture, and wellness behaviors for the improvement of health, and access to these activities should be provided. Problems that arise from the working system in the form of intensive work and shifts must be decreased, the workload per healthcare employee must be decreased, working hours must be regulated, and the sensitivity of managers must be increased. Ergonomic risk analyses must be done in the institutions and units by occupational health and safety teams, and the existing equipment must be modified or regulated ergonomically.

Acknowledgment

This article was based on the master thesis prepared at the Institute of Health Sciences of Kirklareli University. And also, this article was presented as an oral presentation at the 5th International Occupational Safety and Employee Health Congress held in Istanbul in Turkey between 12-13 December 2019, and its full text was published in the proceeding book.

Conflict of interest: The authors have no conflicts of interest to disclose.

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Table 4. Comparison of participants' MSS current pain prevalence, distribution by region with sleep quality frequency.

Pain area	Sleep quality				*p*-value†
	Good (PSQI ≥5)		Poor (PSQI <5)		
	n	%	n	%	
MSS					
No	54	48.6	57	51.4	<0.001
Yes	83	27.9	214	72.1	
Low back					
No	89	39.6	136	60.4	0.005
Yes	48	26.2	135	73.8	
Neck					
No	114	41.2	163	58.8	<0.001
Yes	23	17.6	108	82.4	
Shoulder					
No	116	36.8	199	63.2	0.011
Yes	21	22.6	72	77.4	
Elbow					
No	135	33.7	266	66.3	1.000††
Yes	2	28.6	5	71.4	
Wrist					
No	131	34.1	253	65.9	0.359
Yes	6	25.0	18	75.0	
Finger					
No	135	33.9	263	66.1	0.506††
Yes	2	20.0	8	80.0	
Hip					
No	132	34.2	254	65.8	0.268
Yes	5	22.7	17	77.3	
Knee					
No	124	36.3	218	63.7	0.009
Yes	13	19.7	53	80.3	
Ankle					
No	126	36.4	220	63.6	0.004
Yes	11	17.7	51	82.3	
Toe					
No	136	34.2	262	65.8	0.175††
Yes	1	10.0	9	90.0	

†Pearson Chi-square Test. ††Fisher's Exact Test.

Table 5. Multivariate logistic regression analysis of participants' sleep quality level with a prevalence of MSS pain during the study

	Crude OR (95% CI)	*p*-value	†AOR (95% CI)	*p*-value
Current pain				
No (Ref.)	1		1	
Yes	2.443 (1.557; 3.832)	<0.001	2.156 (1.286; 3.616)	0.004

Ref.: Reference (0). Omnibus Tests of Model Coefficients: p<0.001, Hosmer and Lemeshow Test: p=0.961, Nagelkerke R Square: 0.234.

†Adjusted for sex, age, educational status, occupation, seizure status, smoking status, daily tea/coffee consumption, and chronic or systemic disease

Table 6. Multivariate logistic regression analysis of the sleep quality level of the participants according to the MSS areas during the study

Pain area	Crude OR (95% CI)	*p*-value	†AOR (95% CI)	p
Low back				
No	1		1	
Yes	1.841 (1.204;2.813)	0.005	1.297 (0.791;2.127)	0.302
Neck				
No	1		1	
Yes	3.284 (1.973;5.468)	<0.001	3.147 (1.721;5.756)	<0.001
Shoulder				
No	1		1	
Yes	1.999 (1.168;3.420)	0.012	1.613 (0.833;3.122)	0.156
Elbow				
No	1		1	
Yes	1.269 (0.243;6.625)	0.778	1.046 (0.099;11.039)	0.970
Wrist				
No	1			
Yes	1.553 (0.602;4.007)	0.362	0.424 (0.122;1.478)	0.178
Finger				
No	1		1	
Yes	2.053 (0.430;9.803)	0.367	1.540 (0.246;9.629)	0.644
Hip				
No	1		1	
Yes	1.767 (0.6384.895)	0.274	1.056 (0.322;3.464)	0.929
Knee				
No	1		1	
Yes	2.319 (1.216;4.422)	0.011	1.476 (0.699;3.115)	0.307
Ankle				
No	1			
Yes	2.655 (1.335;5.280)	0.005	1.573 (0.707;3.499)	0.267
Toe				
No	1		1	
Yes	4.672 (0.586;37.258)	0.146	7.670 (0.679;86.580)	0.099

Ref.:Reference (0). Omnibus Tests of Model Coefficients: p<0.001, Hosmer and Lemeshow Test: p=0.876, Nagelkerke R Square: 0.300.

†Adjusted for sex, age, educational status, occupation, seizure status, smoking status, daily tea/coffee consumption, and chronic or systemic disease.