

# Assessment of Pain, Occupational Fatigue, Sleep and Quality of Life in Nurses

## Hemşirelerde Ağrı, Mesleki Yorgunluk, Uyku ve Yaşam Kalitesinin Değerlendirilmesi

Elzem Bolkan Günaydın<sup>1</sup>, Mustafa Çağrı Öcalan<sup>1</sup>, Okan Günaydın<sup>2</sup>, Aslıhan Uzunkulaoglu<sup>1</sup>, Saime Ay<sup>1</sup>

<sup>1</sup>Ufuk University Faculty of Medicine, Department of Physical Medicine and Rehabilitation, Ankara, Turkey

<sup>2</sup>Ankara Yıldırım Beyazıt University, Yenimahalle Training and Research Hospital, Clinic of Emergency Service, Ankara, Turkey

### Abstract

**Objectives:** The aim of this study is to evaluate the pain, occupational fatigue, sleep, and quality of life in nurses and the relationships between them.

**Materials and Methods:** One hundred two volunteer nurses were included in this cross-sectional study. The questions included in the Nordic Musculoskeletal questionnaire, Occupational Fatigue/Exhaustion/Recovery scale, Sleep Hygiene index, and World Health Organization Quality of Life scale Short Form Turkish version questionnaires were answered by the participants. The scores of these questionnaires, professional year, and weekly working hours data were used in the analysis.

**Results:** The most reported body regions where pain or discomfort were felt in the last 12 months were the low back (76.5%), upper back (72.5%), and neck (66.7%); the regions with pain or discomfort that caused work disability in the last 12 months were the low back (42.2%), upper back (30.4%) and neck (25.5%); the regions with pain in the last seven days were the low back (57.8%), upper back (30.4%) and neck (50%), respectively. The mean chronic (52.9±25.3) and acute fatigue (62.8±20.1) sub-scores were at medium-high fatigue levels. High sleep hygiene index scores in the low back pain and work disability due to low back pain in the last 12 months [odds ratio (OR)=1.11, p=0.03; OR=1.11, p=0.005] and high chronic fatigue sub-scores in the work disability due to upper back and neck pain in the last 12 months (OR=1.04, p=0.02; OR=1.05, p=0.002) were found to be significant risk factors.

**Conclusion:** Musculoskeletal problems were common in nurses. Poor sleep hygiene and high chronic fatigue are significant risk factors. Interventions to improve sleep hygiene and reduce chronic fatigue can reduce painful conditions and related disability in nurses.

**Key Words:** Musculoskeletal Pain, Nurse, Fatigue, Sleep Hygiene

### Öz

**Amaç:** Hemşirelerde ağrı, mesleki yorgunluk, uyku ve yaşam kalitesini ve aralarındaki ilişkileri değerlendirmektir.

**Gereç ve Yöntem:** Kesitsel tipteki bu çalışmaya 102 gönüllü hemşire dahil edilmiştir. İskandinav Kas-İskelet Sistemi anketi, Mesleki Yorgunluk/Tükenmişlik/Toparlanma ölçeği, Uyku Hijyen indeksi ve Dünya Sağlık Örgütü Yaşam Kalitesi Kısa Form ölçeği Türkçe versiyonu anketlerinde yer alan sorular katılımcılar tarafından cevaplandırılmıştır. Bu anketlerin skorları, meslek yılı ve haftalık çalışma saati verileri analizlerde kullanılmıştır.

**Bulgular:** Son 12 ayda ağrı ve rahatsızlık yakınması olduğu en sık bildirilen vücut bölgeleri sırasıyla bel (%76,5), sırt (%72,5) ve boyun (%66,7); son 12 ayda iş engeline neden olan ağrı ve rahatsızlık yakınması yaşandığı en sık bildirilen vücut bölgeleri sırasıyla bel (%42,2), sırt (%30,4) ve boyun (%25,5); son 7 günde ağrı yakınması olduğu en sık bildirilen vücut bölgeleri sırasıyla bel (%57,8), sırt (%30,4) ve boyun (%50) bölgeleriydi. Ortalama kronik (52,9±25,3) ve akut (62,8±20,1) yorgunluk alt skorları orta-yüksek yorgunluk düzeyindeydi. Yüksek uyku hijyen indeksi skorunun son 12 aydaki bel ağrısı ve bel ağrısına bağlı iş engeline [odds oranı (OR)=1,11, p=0,03; OR=1,11, p=0,005]; yüksek kronik yorgunluk alt skorunun son 12 aydaki sırt ve boyun ağrısına bağlı iş engeline (OR=1,04, p=0,02; OR=1,05, p=0,002) istatistiksel olarak anlamlı risk faktörleri oldukları tespit edildi.

Address for Correspondence/Yazışma Adresi: Elzem Bolkan Günaydın

Ufuk University Faculty of Medicine, Department of Physical Medicine and Rehabilitation, Ankara, Turkey

Phone: +90 530 978 73 03 E-mail: elzembolkan@yahoo.com ORCID ID: orcid.org/0000-0002-4000-6947

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**Sonuç:** Hemşirelerde kas-iskelet sistemi sorunları yaygın görülmektedir. Kötü uyku hijyeni ve yüksek kronik yorgunluk önemli risk faktörleridir. Uyku hijyenini artırmaya ve kronik yorgunluğu azaltmaya yönelik müdahaleler hemşirelerde ağrılı durumları ve bunlara bağlı disabilitiyi azaltabilir.

**Anahtar Kelimeler:** Kas iskelet Ağrısı, Hemşire, Yorgunluk, Uyku Hijyeni

## Introduction

Musculoskeletal problems are one of the most important occupational health problems that are common in many professions worldwide (1). The definition of work-related musculoskeletal problems includes symptoms of pain, discomfort, or tissue damage that arise or increase with the influence of work-related risk factors (2).

It is known that work-related musculoskeletal problems are common among healthcare professionals (1,3). Epidemiological studies show that musculoskeletal problems are major occupational health problems for nurses (4). The prevalence of musculoskeletal problems in nurses worldwide is between %40-90 (1). In Turkey, the prevalence has been shown to be 79.5% (4,5).

Both physical and psychosocial work-related factors (standing for a long time, working in shifts, daily workload, job dissatisfaction, etc.) may be factors in musculoskeletal system problems (4). Work-related musculoskeletal problems in nurses can bring along problems such as difficulty at work, increase in the number of days spent as sick, poor health status, decrease in quality of life, absenteeism, quitting work, early retirement (3,4).

In professions such as nursing, where shift work is common, changes in working hours cause irregular sleep patterns (6). In the literature, it has been shown that there is a correlation between sleep and pain, and it is known that poor sleep quality in most patients with chronic pain and bad sleep triggers an increase in pain (7).

Fatigue is a complex concept that affects the biological, physiological, and cognitive processes of individuals (8,9). It has been reported that the main factors that cause work-related fatigue are shift work patterns, sleep irregularities, insufficient recovery time, long working hours, disruption in normal body circadian rhythm, and heavy workload (10). In nurses, fatigue is a major work-related factor and has an impact on performance, patient care, and decision-making (8,9). Fatigue has a negative effect on the health and well-being of nurses in the long term (10).

The concept of quality of life covers the physical functions, mental state, social relations, environmental conditions of individuals, and the effects of these characteristics on the functionality of the individual (11). Occupational risks that may lead to musculoskeletal problems can lead to deterioration in the quality of life and functionality of nurses (11,12).

In this study, it was aimed to evaluate the pain, occupational fatigue, sleep, and quality of life in nurses and the relationships between them.

## Materials and Methods

One hundred two volunteer nurses working at a university hospital were included in this cross-sectional study between January 2021 and March 2021. Participants with a history of serious trauma and orthopedic surgery and chronic severe internal and neurological diseases in the last year were excluded from the study. The informed consent of the participants and ethics committee approval were obtained Ethics Committee of Ankara Yıldırım Beyazıt University, Yenimahalle Training and Research Hospital (decision number and date: 2020-3-17/12.16.2020). The principles of the Declaration of Helsinki were followed in the conduct of the study. Study data were collected by questionnaires. The data on age, gender, height, weight, working year in the profession, weekly working hours, hand dominance, diagnosed diseases, and marital status of the participants were collected. Subsequently, the questions included in the Nordic Musculoskeletal Questionnaire, Occupational Fatigue/Exhaustion/Recovery scale (OFER), sleep hygiene index (SHI), and World Health Organization Quality of Life Scale Short Form Turkish version (WHOQOL-BREF-TR) questionnaires were answered by the participants.

### Outcome Parameters

**The Nordic Musculoskeletal Questionnaire:** This scale evaluates whether there have been pain and discomfort symptoms in the neck, shoulder, elbow, hand-wrist, low back, upper back, hip-thigh, knee, foot-ankle regions during the last 12 months, whether the usual domestic and outdoor works are prevented due to these symptoms, and whether the pain has been experienced in the mentioned body areas for the last seven days. It was developed by Kuorinka et al. (13) in 1987. It consists of 27 items, and each item is answered as yes/no. The cultural adaptation study was done by Kahraman et al. (14) in 2016.

**OFER:** It is a scale developed by Winwood et al. (15) in 2005 to measure occupational fatigue. It consists of 15 items in total and three sub-dimensions evaluating chronic fatigue, acute fatigue, and recovery. Each item is scored between 0-6 points by the participants. The separate scores are calculated for each sub-dimension. The scores in each sub-dimension range from 0 to 100. High scores in the chronic and acute fatigue sub-dimensions mean higher occupational fatigue, and higher scores in the recovery sub-dimension mean better recovery

between working periods. In the fatigue sub-dimensions, 0-25 points indicate low fatigue, 25-50 points medium-low fatigue, 50-75 points medium-high fatigue, and 75-100 points indicate high fatigue (15,16). The validity and reliability study in Turkey was made by Havlioglu et al. (16) in 2019.

**SHI:** It is a scale that evaluates sleep hygiene developed by Mastin et al. (17) in 2006. The frequencies of sleep hygiene-related behaviors are questioned in a total of 13 items with a Likert-type scale where each item is scored between 1 and 5. The total score ranges from 13-65, and higher scores indicate worse sleep hygiene (17). The reliability and validity study in Turkey was conducted by Ozdemir et al. (18) in 2015.

**WHOQOL-BREF-TR:** It is a scale developed by the WHOQOL group that evaluates the well-being of individuals in 4 sub-areas in which the physical health, psychological state, social relations, and environmental conditions are questioned, and their general quality of life and health status with one question (19). The Turkish version of the scale, whose original version consists of 26 questions, includes the national question 27<sup>th</sup> question ['Do you have pressure and control problems in your relationships with people close to you (spouse, colleague, relative) in your life? (20)'], and when the Turkish version is used, environment-TR sub-score is used instead of the environment sub-score in the original (20). Each item is scored on a 1-5 Likert-type scale. The domain scores, ranging from 4-20, express the quality of life in their field independently of each other. Higher scores indicate better quality of life (19). The validity study in Turkey was conducted by Eser et al. (20) in 1999.

### Statistical Analysis

The statistical analyzes were performed using the SPSS (Statistical Package for Social Sciences, SPSS Inc, Chicago Ill, USA) version 20 program. The conformity of the variables to normal distribution was examined by visual (histogram and probability charts) and analytical methods (Kolmogorov-Smirnov/Shapiro Wilk's tests), and homogeneity of variances was examined using the Levene test. In descriptive analyzes, continuous variables were expressed as mean and standard deviation, and categorical variables were expressed as numbers and percentages. The independent groups' t-test was used for comparing the data that met the parametric test conditions between the two groups, and the Mann-Whitney U test was used for the comparison of data that did not provide them. The chi-square test was used for the comparison of the categorical data. To examine the relationships between variables, the Pearson correlation analysis (two-tailed) was used for variables that both conformed to the normal distribution, and the Spearman test (two-tailed) was used for variables at least one of which did not fit the normal distribution. The possible risk factors in predicting painful situations were examined by the logistic regression analysis; the model fit assessment was made

using the Hosmer-Lemeshow test. The statistical significance level was determined as  $p=0.05$ .

## Results

Sixty-seven women (65.5%) and 35 men (34.3%) participants were included in the study. The mean age of the participants was calculated as  $39.2\pm 9.9$  years (minimum - maximum=24-65). Sixty-five (63.7%) participants were married, 37 (36.3%) participants were single. Twenty (19.6%) participants had a diagnosed disease. There were diabetes mellitus in 4 persons, hypertension in 4 persons, hypothyroidism in 3 persons, asthma in 2 persons, coronary artery disease in 1 person, mitral insufficiency in 1 person, ankylosing spondylitis in 1 person, rheumatoid arthritis in 1 person, lumbar discopathy in 4 persons, cervical discopathy in 1 person, anxiety disorder in 1 person. The mean height of the participants was  $166\pm 9.91$  cm (minimum - maximum=130-191), and the mean weight was  $69.2\pm 14.8$  kg (40-110). The dominant hand was right in 93 (91.2%) participants and was left in 9 (8.8%) participants. The descriptive statistics regarding the evaluation parameters in the study are shown in Table 1.

The participants' mean chronic fatigue sub-score ( $52.9\pm 25.3$ ) and acute fatigue sub-score ( $62.8\pm 20.1$ ) evaluated by OFER were observed to be at medium-high fatigue levels (15,16).

The data regarding the comparison results of the parameters included in the study between the groups with and without pain for each body area questioned are shown in Tables 2-4.

There was a positive, very good, significant correlation between the chronic fatigue and the acute fatigue sub-scores ( $r=0.70$   $p=0.00$ ). There was a good, significant, negative correlation between chronic fatigue and the recovery sub-scores ( $r=-0.61$   $p=0.00$ ). There were good, significant positive correlations between the general health and the physical sub-scores ( $r=0.63$   $p=0.00$ ), between the physical and psychological sub-scores ( $r=0.63$   $p=0.00$ ), between the psychological and social sub-scores ( $r=0.68$   $p=0.00$ ). The correlations between the variables other than these were moderate, low, or statistically insignificant.

In the evaluation of the possible risk factors for painful situations in the low back, upper back, and neck region, which are the regions where painful situations are most frequently observed, the high sleep hygiene index scores in the low back pain and work disability due to low back pain in the last 12 months [odds ratio (OR) 95% confidence interval (CI)=1.11 (1.01-1.21),  $p=0.03$ ; OR (95% CI)=1.11 (1.03-1.20),  $p=0.005$ ] and the high chronic fatigue sub-scores in the work disability due to upper back and neck pain in the last 12 months [OR (95% CI)=1.04 (1.01-1.07),  $p=0.02$ , OR (95% CI)=1.05 (1.02-1.09),  $p=0.002$ ] were found to be a statistically significant risk factors.

## Discussion

In this study, in which it was aimed to evaluate the pain, occupational fatigue, sleep and quality of life in nurses and the relations between them, it was determined that the first three body regions where musculoskeletal problems were most frequently reported were the low back, upper back and neck regions. The results obtained from our study are similar to the results of studies conducted on the subject in the literature. In

the systematic review conducted by Ellapen and Narsigan (3) in 2014, in which they investigated work-related musculoskeletal problems in nurses, the average prevalence was reported to be 71.8%, and the regions with the most frequent complaints were the low back, upper back, and shoulders. Soler-Font et al. (21), reported that the neck-upper back (with 87% prevalence) and low back (with 77.5% prevalence) were determined as the regions where the pain was reported most frequently in nurses. In the systematic review conducted by Soyular and Ozer (4) in 2018, in which the prevalence of musculoskeletal problems in

**Table 1: The descriptive statistics regarding the evaluation parameters**

**Pain in the past 12 months (n-%)**

Neck	68 (66.7%)
Shoulder	64 (62.7%)
Elbow	21 (20.6%)
Hand-wrist	30 (29.4%)
Upper back	74 (72.5%)
Low back	78 (76.5%)
Hip-thigh	37 (36.3%)
Knee	40 (39.2%)
Foot-ankle	44 (43.1%)

**Pain-related work disability in the last 12 months (n-%)**

Neck	26 (25.5%)
Shoulder	19 (18.6%)
Elbow	5 (4.9%)
Hand-wrist	10 (9.8%)
Upper back	31 (30.4%)
Low back	43 (42.2%)
Hip-thigh	16 (15.7%)
Knee	14 (13.7%)
Foot-ankle	17 (16.7%)

**Pain in the last seven days (n-%)**

Neck	51 (50%)
Shoulder	37 (36.3%)
Elbow	10 (9.8%)
Hand-wrist	18 (17.6%)
Upper back	56 (54.9%)
Low back	59 (57.8%)
Hip-thigh	21 (20.6%)
Knee	24 (23.5%)
Foot-ankle	27 (26.5%)

Professional years - year (mean ± SD) (min.-max.)	14.1±9.5 (5-50)
Weekly working time -hours/week (mean ± SD) (min.-max.)	46.9±11.8 (25-96)
OFER chronic fatigue sub-score -% (mean ± SD) (min.-max.)	52.9±25.3 (3.3-100)
OFER acut fatigue sub-score -% (mean ± SD) (min.-max.)	62.8±20.1 (13.3-100)
OFER recovery sub-score-% (mean ± SD) (min.-max.)	49.8±19.6 (6.6-100)
Sleep hygiene index score (mean ± SD) (min.-max.)	28.1±6.7 (16-43)
WHOQOL-BREF-TR general quality of life sub-score (mean ± SD) (min.-max.)	3.2±0.9 (1-5)
WHOQOL-BREF-TR general health sub-score (mean ± SD) (min.-max.)	3.4±0.9 (1-5)
WHOQOL-BREF-TR physical sub-score (mean ± SD) (min.-max.)	14.1±2.4 (9.1-20)
WHOQOL-BREF-TR psychological sub-score (mean ± SD) (min.-max.)	14.5±2.2 (9.3-20)
WHOQOL-BREF-TR social sub-score (mean ± SD) (min.-max.)	14.2±2.6 (8-20)
WHOQOL-BREF-TR environment-TR sub-score (mean ± SD) (min.-max.)	13.9±2 (8.8-18.6)

SD: Standard deviation, min.: Minimum, max.: Maximum, OFER: Occupational Fatigue/Exhaustion/Recovery scale, WHOQOL-BREF-TR: World Health Organization Quality of Life Scale Short Form Turkish version

Table 2: The comparison of variables in the painful situations in the last 12 months

	Professional years (year)	Weekly working time (hours/week)	Chronic fatigue sub-score	Acute fatigue sub-score	Recovery sub-score	Sleep hygiene index score	General quality of life sub-score	General health sub-score	Physical sub-score	Psychological sub-score	Social sub-score	Environment-TR sub-score
<b>Neck pain</b>												
Yes (n=68)	13.6±9.3	47.3±13.5	57.6±24.9	64.7±19.1	47.2±18.2	28.9±6.8	3.2±0.7	3.3±0.8	13.8±2.2	14.3±2.2	14.3±2.7	13.8±1.8
No (n=34)	15.3±9.9	45.9±7.7	43.4±23.8	59±21.9	55±21.4	26.5±6.2	3.2±1.1	3.5±1.1	14.8±2.6	14.9±2.3	14.1±2.4	14.2±2.2
p	0.39	0.59	<b>0.007</b>	0.19	<b>0.05</b>	0.14	0.75	0.15	<b>0.04</b>	0.20	0.86	0.27
<b>Shoulder pain</b>												
Yes (n=64)	13.1±9.2	47.4±13.7	56.8±27	64.5±20.6	47±19.7	28.9±6.7	3.2±0.8	3.3±0.9	13.9±2.3	14.2±2.2	14.3±2.9	13.7±1.8
No (n=38)	15.8±9.9	46±7.9	46.1±20.7	59.9±19.3	54.6±18.8	26.7±6.4	3.2±1	3.6±0.9	14.5±2.6	15±2.2	14.2±2	14.3±2.1
p	0.17	0.47	<b>0.02</b>	0.18	<b>0.05</b>	0.13	0.70	<b>0.02</b>	0.19	0.10	0.98	0.10
<b>Elbow pain</b>												
Yes (n=21)	19±12.1	46.3±13.2	49.4±31.1	57.8±23	51.8±20.4	27.7±6.8	3.2±1	3.2±1	14.2±2.5	14.3±2	14.6±2.3	13.3±1.7
No (n=81)	12.9±8.3	47±11.5	53.7±23.7	64.1±19.3	49.3±19.5	28.2±6.7	3.2±0.8	3.4±0.9	14.1±2.4	14.6±2.3	14.2±2.7	14.1±2
p	<b>0.02</b>	0.57	0.45	0.28	0.56	0.90	0.67	0.36	0.93	0.58	0.52	0.09
<b>Hand-wrist pain</b>												
Yes (n=30)	16.4±9.8	49±17.3	51.6±27	60.5±22.4	48.6±20.5	28.5±6.3	3.2±0.8	3.2±0.9	13.7±2.5	14±2.1	14.3±2.2	13.3±1.6
No (n=72)	13.2±9.2	46±8.6	53.4±24.7	63.8±19.2	50.3±19.3	28±6.8	3.2±0.9	3.5±0.9	14.3±2.3	14.7±2.3	14.2±2.8	14.2±2.1
p	0.12	0.91	0.74	0.57	0.68	0.62	0.65	0.19	0.24	0.15	0.92	<b>0.04</b>
<b>Upper back pain</b>												
Yes (n=74)	13.4±9.2	48±13.3	54.9±25.6	64.7±19.7	46.9±18.6	29±6.7	3.1±0.9	3.3±0.9	13.9±2.3	14.5±2.1	14.5±2.6	13.8±1.8
No (n=28)	16±10	43.9±5.9	47.5±24	57.8±20.8	57.5±20.3	25.8±6.2	3.4±0.9	3.6±0.9	14.7±2.6	14.6±2.6	13.6±2.6	14.2±2.3
p	0.34	0.39	0.26	0.10	<b>0.02</b>	<b>0.04</b>	0.29	0.14	0.25	0.81	0.29	0.55
<b>Low back pain</b>												
Yes (n=78)	14.3±8.9	47.7±13.1	54.7±24.5	63.8±20.2	49.5±20.5	29.1±6.4	3±0.9	3.2±0.9	13.6±2.3	14.4±2.3	14.2±2.5	13.7±2
No (n=24)	13.6±11.2	44.3±5.8	46.9±27.5	59.5±20.1	50.8±16.6	25±6.6	3.7±0.8	3.9±0.7	15.7±2	14.8±2	14.3±3	14.4±1.9
p	0.48	0.64	0.25	0.38	0.85	<b>0.01</b>	<b>0.004</b>	<b>0.003</b>	<b>0.000</b>	0.47	0.87	0.11
<b>Hip-thigh pain</b>												
Yes (n=37)	15.5±10.3	48.1±16.3	60±27.5	66.7±21.5	50.7±22.3	30.5±6.9	3±0.8	3±1	12.9±2.3	13.8±2.2	14±2.4	13.7±2.1
No (n=65)	13.3±8.9	46.2±8.4	48.8±23.2	60.6±19.2	49.3±18	26.8±6.1	3.3±0.9	3.6±0.8	14.8±2.1	14.9±2.1	14.4±2.7	14.1±1.9
p	0.27	0.66	<b>0.03</b>	0.13	0.72	<b>0.007</b>	0.08	<b>0.004</b>	<b>0.000</b>	<b>0.01</b>	0.35	0.33
<b>Knee pain</b>												
Yes (n=40)	16.2±9.6	46.7±15.7	58.2±24.4	65.5±20.5	46.9±19.8	28.9±6.8	3.1±0.8	3.3±1	13.4±2.3	14.2±2.2	14.4±2.9	13.5±2.06
No (n=62)	12.8±9.2	47±8.7	49.4±25.5	61±19.9	51.7±19.4	27.6±6.6	3.3±0.9	3.5±0.9	14.6±2.3	14.7±2.2	14.2±2.4	14.2±1.9
p	0.07	<b>0.03</b>	0.09	0.27	0.23	0.33	0.07	0.41	<b>0.009</b>	0.25	0.79	0.10
<b>Foot-ankle pain</b>												
Yes (n=44)	13.8±9.4	47.8±14.7	58.1±22.8	69.5±17	46.1±18.7	28.7±6	3±0.8	3.2±0.9	13.5±2.3	14.1±2.5	14.1±2.7	13.4±1.8
No (n=58)	14.4±9.6	46.1±9.2	48.9±26.5	57.7±20.9	52.6±20	27.7±7.1	3.4±0.9	3.5±0.9	14.6±2.4	14.9±2	14.3±2.5	14.3±2
p	0.77	0.64	0.06	<b>0.004</b>	0.09	0.39	<b>0.01</b>	0.06	<b>0.03</b>	0.06	0.53	0.01

\*The statistical significance level is p=0.05

Table 3: The comparison of variables in the pain-related work disability situations in the last 12 months

	Professional years (Year)	Weekly working time (hours/week)	Chronic fatigue sub-score	Acute fatigue sub-score	Recovery sub-score	Sleep hygiene index score	General quality of life sub-score	General health sub-score	Physical sub-score	Psychological sub-score	Social sub-score	Environment-TR sub-score
<b>Neck pain</b>												
Yes (n=26)	15.3±9.5	46.8±13.4	65±27.2	65.7±20.5	47.1±19.8	28.8±7.7	3.1±0.8	3.3±0.6	13.6±2.1	13.8±1.9	13.9±2.6	13.2±2.1
No (n=76)	13.7±9.5	46.9±11.3	48.7±23.4	61.8±20	50.7±19.6	27.9±6.3	3.2±0.9	3.4±1	14.3±2.5	14.8±2.3	14.4±2.6	14.1±1.9
p	0.36	0.42	<b>0.01</b>	0.46	0.39	0.73	0.79	0.15	0.18	0.059	0.44	<b>0.03</b>
<b>Shoulder pain</b>												
Yes (n=19)	15.5±9.7	44.4±10.4	69.8±24	67.1±20.2	43.4±16	30.6±7.7	3±0.7	3.1±0.8	12.9±2.3	13.3±1.7	13.6±2.7	13±2
No (n=83)	13.8±9.4	47.4±12.1	49±24.1	61.8±20.1	51.3±20.1	27.5±6.3	3.3±0.9	3.5±0.9	14.4±2.3	14.8±2.2	14.4±2.6	14.1±1.9
p	0.44	0.33	<b>0.002</b>	0.33	0.14	0.08	0.15	<b>0.02</b>	<b>0.01</b>	<b>0.007</b>	0.24	<b>0.01</b>
<b>Elbow pain</b>												
Yes (n=5)	15.6±14.4	44±20.7	71.9±26.8	67.9±20.6	39.3±13	31.4±10.1	2.6±0.5	2.8±0.4	11.7±2.7	11.9±1	11.9±2.9	12.5±1.9
No (n=97)	14.1±9.3	47±11.4	51.9±25	62.5±20.2	50.4±19.8	28±6.5	3.2±0.9	3.4±0.9	14.3±2.3	14.7±2.2	14.4±2.5	14±1.9
p	0.89	0.10	0.10	0.62	0.18	0.30	0.058	<b>0.04</b>	<b>0.04</b>	<b>0.006</b>	0.07	0.11
<b>Hand-wrist pain</b>												
Yes (n=10)	15.5±10.5	47.4±16.4	57.6±25.3	61.6±21.4	50.9±22	26.5±7.8	3.3±0.4	3.3±0.9	14.4±2.3	14.1±2	15.1±2.6	13.1±1.8
No (n=92)	14±9.4	46.8±11.3	52.3±25.4	62.9±20.1	49.7±19.5	28.3±6.5	3.2±0.9	3.4±0.9	14.1±2.4	14.6±2.2	14.2±2.6	14±2
p	0.52	0.68	0.57	0.77	0.92	0.27	0.98	0.48	0.80	0.40	0.28	0.19
<b>Upper back pain</b>												
Yes (n=31)	14.3±10.5	48±15.7	63.7±24.4	66.4±21.6	46.4±19.3	30±7.2	3.2±0.6	3.1±0.7	13±2.1	14.1±2.1	14.2±2.4	13.3±1.9
No (n=71)	14.1±9.1	46.3±9.8	48.1±24.4	61.2±19.4	51.3±19.7	27.3±6.3	3.2±1	3.5±1	14.6±2.3	14.7±2.3	14.2±2.7	14.2±2
p	0.92	0.45	<b>0.004</b>	0.22	0.24	0.09	0.74	<b>0.02</b>	<b>0.001</b>	0.20	0.97	<b>0.05</b>
<b>Low back pain</b>												
Yes (n=43)	13.9±8.9	47.4±14.5	59.1±25.6	65.3±20.6	49.8±21	30.7±6.8	3±0.8	3.1±0.9	13.1±2.2	14.1±1.9	14.1±2.5	13.3±1.9
No (n=59)	14.3±9.9	46.5±9.5	48.3±24.2	61±19.8	49.8±18.7	26.2±6	3.3±0.9	3.6±0.9	14.9±2.2	14.9±2.4	14.4±2.6	14.3±2
p	0.80	0.44	<b>0.03</b>	0.27	0.98	<b>0.002</b>	0.059	<b>0.01</b>	<b>0.000</b>	0.07	0.54	<b>0.01</b>
<b>Hip-thigh pain</b>												
Yes (n=16)	16±8.4	43.6±11.2	63.5±24.1	69.1±20.4	52.6±19.5	30.1±7.3	2.8±0.8	2.5±0.8	11.9±1.8	13.2±2.3	13.5±2.2	13.1±2
No (n=86)	13.8±9.7	47.5±11.9	50.9±25.1	61.6±20	49.3±19.7	27.7±6.5	3.3±0.9	3.6±0.8	14.6±2.2	14.8±2.1	14.4±2.6	14.1±1.9
p	0.34	0.12	0.08	0.19	0.45	0.33	0.06	<b>0.000</b>	<b>0.000</b>	<b>0.01</b>	0.21	0.09
<b>Knee pain</b>												
Yes (n=14)	16.1±11.5	46.7±16.8	67.3±17.8	66.4±16.5	39.9±12.6	28.9±6.7	2.9±0.4	3.3±1	13.1±1.9	14.1±1.9	14.3±2.7	13.7±1.8
No (n=88)	13.8±9.2	46.9±11	50.6±25.6	62.2±20.7	51.4±20.1	28±6.7	3.3±0.9	3.4±0.9	14.3±2.4	14.6±2.3	14.2±2.6	13.9±2
p	0.44	0.12	<b>0.01</b>	0.53	<b>0.03</b>	0.51	0.06	0.57	0.10	0.37	0.79	0.82
<b>Foot-ankle pain</b>												
Yes (n=17)	17.5±11.2	48±16.4	61.5±21.4	68.5±16	45.6±13.6	27.4±6	3±0.6	3±1	13.4±2	13.9±1.7	14.3±3	13.6±2
No (n=85)	13.4±9	46.6±10.8	51.1±25.8	61.6±20.8	50.7±20.5	28.3±6.8	3.2±0.9	3.5±0.9	14.3±2.4	14.6±2.3	14.2±2.5	14±2
p	0.10	0.37	0.10	0.22	0.40	0.74	0.11	<b>0.02</b>	0.17	0.19	0.84	0.58

\*The statistical significance level is p=0.05.

Table 4: The comparison of variables in the painful situations in the last seven days

	Professional years (year)	Weekly working time (hours/week)	Chronic fatigue sub-score	Acute fatigue sub-score	Recovery sub-score	Sleep hygiene index score	General quality of life sub-score	General health sub-score	Physical sub-score	Psychological sub-score	Social sub-score	Environment-TR sub-score
<b>Neck pain</b>												
Yes (n=51)	12.6±9	48.3±14.2	60.4±25.5	67.4±18.4	44.7±18.2	29.8±7.1	3±0.8	3.2±0.7	13.5±2.1	13.8±2.1	13.9±2.6	13.3±1.8
No (n=51)	15.7±9.8	45.5±8.8	45.3±22.9	58.2±20.9	55±19.8	26.4±5.8	3.4±0.9	3.6±1.1	14.8±2.5	15.2±2.2	14.6±2.5	14.5±2
p	0.09	0.67	<b>0.002</b>	<b>0.02</b>	<b>0.008</b>	<b>0.02</b>	<b>0.02</b>	<b>0.009</b>	<b>0.007</b>	<b>0.002</b>	0.17	<b>0.002</b>
<b>Shoulder pain</b>												
Yes (n=37)	13.7±8.6	45±8	60.1±25.6	66.9±17.3	46.7±17.1	28.1±6.7	3.2±0.8	3.3±0.9	13.8±2.4	14.1±2.4	14±3.1	13.6±2
No (n=65)	14.4±10	48±13.5	48.7±24.3	60.4±21.3	51.6±20.8	28.2±6.7	3.2±0.9	3.4±0.9	14.3±2.4	14.7±2.1	14.4±2.2	14.1±1.9
p	0.74	0.43	<b>0.02</b>	0.15	0.22	0.76	0.77	0.26	0.33	0.17	0.42	0.19
<b>Elbow pain</b>												
Yes (n=10)	15.3±7.3	44.7±14.7	51.6±36.4	56.2±23.1	51.3±14.7	32.2±7.6	3.4±0.8	3.4±1	14.1±3	14.4±2.4	14.7±2.7	13.4±1.7
No (n=92)	14±9.7	47.1±11.5	53±24.1	63.5±19.8	49.7±20.1	27.7±6.5	3.2±0.9	3.4±0.9	14.1±2.3	14.5±2.2	14.2±2.6	14±2
p	0.45	0.47	0.71	0.31	0.74	0.09	0.69	0.97	0.91	0.83	0.61	0.27
<b>Hand-wrist pain</b>												
Yes (n=18)	14.8±9.3	49.5±17.6	50.1±27.8	57.1±21.3	44.7±19.4	28.6±6.6	3.1±0.8	3.6±0.7	14.1±2.6	14.2±2.5	14.5±2.4	13.2±1.7
No (n=84)	14±9.6	46.3±10.3	53.4±24.9	64±19.8	50.9±19.6	28±6.7	3.2±0.9	3.4±0.9	14.1±2.3	14.6±2.2	14.2±2.6	14.1±2
p	0.56	0.69	0.60	0.23	0.20	0.67	0.36	0.52	0.96	0.45	0.76	0.06
<b>Upper back pain</b>												
Yes (n=56)	13.8±9.3	48±13.6	57.1±26.6	65.5±19.1	45.8±18.2	29.3±6.6	3±0.8	3.2±0.9	13.8±2.2	14.4±2.1	14.5±2.5	13.7±1.9
No (n=46)	14.6±9.8	45.5±9.1	47.7±22.9	59.5±21.1	54.7±20.4	26.7±6.6	3.4±0.9	3.7±0.9	14.6±2.5	14.6±2.4	13.9±2.7	14.2±2
p	0.68	0.74	0.06	0.14	<b>0.02</b>	0.07	<b>0.03</b>	<b>0.007</b>	0.08	0.66	0.45	0.25
<b>Low back pain</b>												
Yes (n=59)	15.2±9.2	47.4±14	57.8±26	65.6±19.7	49.3±20.2	29.3±6.3	3±0.8	3.1±0.9	13.5±2.2	14.5±2.1	14.3±2.5	13.8±1.9
No (n=43)	12.7±9.7	46.2±8.1	46.1±22.8	59±20.4	50.5±19	26.4±6.8	3.5±0.9	3.7±0.8	15.1±2.3	14.6±2.4	14.1±2.7	14±2.1
p	0.19	0.37	<b>0.02</b>	0.10	0.77	<b>0.04</b>	<b>0.003</b>	<b>0.001</b>	<b>0.001</b>	0.80	0.84	0.65
<b>Hip-thigh pain</b>												
Yes (n=21)	15.8±7.8	45.2±13.3	64.5±25.9	66.6±19.5	51.5±19.8	30.7±6.3	3.1±0.6	2.8±1	12.6±2.2	14±2.5	14.5±1.9	14±1.8
No (n=81)	13.7±9.8	47.3±11.5	49.8±24.4	61.8±20.3	49.4±19.6	27.5±6.6	3.2±0.9	3.6±0.8	14.5±2.3	14.7±2.1	14.2±2.7	13.9±2
p	0.24	0.12	<b>0.02</b>	0.38	0.49	<b>0.05</b>	0.24	<b>0.001</b>	<b>0.001</b>	0.12	0.82	0.87
<b>Knee pain</b>												
Yes (n=24)	15.4±9.6	46.9±14	62±23	67.8±15.7	48.9±17.6	28.8±6.3	3±0.9	3.2±1.1	13.1±2.1	14.3±2.2	14.5±3.3	13.5±2.2
No (n=78)	13.7±9.5	46.9±11.2	50±25.4	61.2±21.2	50.1±20.3	27.9±6.8	3.3±0.9	3.5±0.8	14.4±2.4	14.6±2.2	14.2±2.4	14±1.9
p	0.36	0.30	<b>0.04</b>	0.20	0.74	0.50	0.10	0.30	<b>0.01</b>	0.40	0.59	0.28
<b>Foot-ankle pain</b>												
Yes (n=27)	14.8±9.2	49.3±15.8	54.5±23.2	67.6±15.7	48.9±17.4	27.9±5.9	3.1±0.7	3.2±1.1	13.8±2.4	14.2±2.2	14.7±2.5	13.7±1.9
No (n=75)	13.9±9.6	46±10	52.3±26.1	61.1±21.3	50.1±20.4	28.2±7	3.2±0.9	3.5±0.8	14.2±2.4	14.6±2.2	14.1±2.6	14±2
p	0.53	0.90	0.74	0.19	0.86	0.96	0.45	0.14	0.42	0.36	0.42	0.51

\*The statistical significance level is p=0.05.

nurses in the last 12 months was evaluated, it was reported that the prevalence varied between 33–88%, and the most frequently affected area was the low back region (49–84%). Karahan et al. (22) examined the prevalence of low back pain in the hospital workers, 61.3% of the participants reported that they experienced low back pain in the last 12 months, and the highest prevalence was observed in nurses with 77.1%. In a cross-sectional study conducted by Pinar (5) on 2400 nurses, it was found that the 12-month prevalence of pain in nurses was 79.5%, and the body parts with the highest prevalence were low back (49.7%), shoulder (38%), and neck (35%).

In our study, it was determined that the participants' average acute and chronic fatigues were at moderate-high fatigue levels. The high sleep hygiene index scores in the low back pain and work disability due to low back pain in the last 12 months and the high chronic fatigue sub-scores in work disability due to upper back and neck pain in the last 12 months were found to be statistically significant risk factors. Younan et al. (23) stated that the frequency of musculoskeletal problems in nurses in the last 12 months was 71.3%, mostly caused by low back pain, and that is correlated with the level of chronic occupational fatigue. In the study of Çelik et al. (8), in which they examined the level of fatigue in intensive care nurses, they showed that fatigue levels were high and correlated with poor sleep. In the systematic review conducted by Whibley et al. (7) in 2019, examining the relationship between sleep and pain, they showed that bad sleep is associated with worse pain. Li et al. (24) stated that chronic fatigue and recovery were direct predictors of sleep quality disorders, and acute fatigue was an indirect predictor. In a systematic review about fatigue and recovery in nurses, it was stated that bad sleep can affect recovery and cause fatigue and maladaptive chronic health problems (10).

Ungard et al. (25) noted that the recovery time between shifts is an important factor in fatigue in nurses. Gifkins et al. (10) stated that if the proper recovery is not achieved in the acute fatigue, the fatigue can accumulate and turn into chronic fatigue, and the appropriate recovery plays an important role in preventing acute fatigue from becoming chronic.

Joslin et al. (26) stated that the mental, physical health status and overall quality of life scores were lower in the patients with neck pain in the assessment of the quality of life, and this situation was attributed to the psychological stress by the patients. In the review by Al-Mutairi (12) in 2019, in which they evaluated the quality of life in nurses with low back pain, it was stated that the low back pain and physical capacity are related, the patients' fear of experiencing pain leads to limitation in their physical activities, this situation brings muscle weakness or activity intolerance and the most important predictor of disability is the duration of pain.

Smith et al. (27) reported that the weekly working period and professional year were not found as risk factors in musculoskeletal problems in nurses. Similarly, in the Cochrane review by Luger et al. (28) on the regulation of working hours in the prevention of musculoskeletal symptoms in healthy workers, it was stated that the evidence for the effects of different working hour regulations on reducing the incidence of musculoskeletal problems is weak. Similar to these studies, in our study, the statistically significant differences were only detected in the following; the professional year was found to be significantly higher in the group with elbow pain in the last 12 months compared to the group without, and the weekly working time was found to be significantly higher in the group without knee pain in the last 12 months compared to the with; but the statistical significance levels were relatively low ( $p=0.02$ ,  $p=0.03$ ).

### Study Limitations

The limitation of our study is that the age, gender, height, and weight variables, which are thought to have an effect on painful conditions, were not included in the further analysis to evaluate risk factors. However, the fact that the weekly working time, fatigue and recovery situations, and sleep hygiene evaluations which are thought to be changeable risk factors, are predominantly included constitute a superior aspect of the study in terms of guiding future intervention studies. Another superior aspect of the study is that the pain-related risk factors were evaluated separately for each body region included in the assessment. It is thought that planning studies in which risk factors related to the subject and the effectiveness of interventions directed to these factors are investigated can contribute to the literature and provide guidance in practical applications.

### Conclusion

It was observed that musculoskeletal problems were common in nurses and were most frequently reported in the low back, upper back, and neck regions, respectively, and their average acute and chronic fatigues were at moderate-high fatigue levels. Poor sleep hygiene was found to be a risk factor for the low back pain and work disability due to low back pain in the last 12 months, and the high chronic fatigue was found to be a risk factor for the work disability due to upper back and neck pain in the last 12 months. Interventions to improve sleep hygiene and reduce chronic fatigue can reduce painful conditions and related disability in nurses.

### Ethics

**Ethics Committee Approval:** Ethics committee approval was obtained from Ethics Committee of Ankara Yıldırım Beyazıt University, Yenimahalle Training and Research Hospital (decision number and date: 2020-3-17/12.16.2020).



**Informed Consent:** The informed consent of the participants was obtained.

**Peer-reviewed:** Externally peer-reviewed.

### Authorship Contributions

Concept: E.B.G., M.Ç.Ö., O.G., A.U., S.A., Design: E.B.G., M.Ç.Ö., O.G., A.U., S.A., Data Collection or Processing: E.B.G., M.Ç.Ö., O.G., A.U., S.A., Analysis or Interpretation: E.B.G., M.Ç.Ö., O.G., A.U., S.A., Writing: E.B.G., M.Ç.Ö., O.G., A.U., S.A.

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