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# Evaluation of the effects of the COVID-19 pandemic on pain, stress, sleep and quality of life in patients with chronic musculoskeletal pain

**Elzem Bolkan Günaydın, Mustafa Çağrı Öcalan, Aslıhan Uzunkulaoğlu, Saime Ay**

*Ufuk University Faculty of Medicine, Department of Physical Medicine and Rehabilitation, Ankara, Türkiye*

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**Corresponding Author:**
Elzem Bolkan Günaydın M.D.,
Ufuk University Faculty of Medicine, Department of Physical Medicine and Rehabilitation, Ankara, Türkiye
elzembolkan@yahoo.com

**ORCID:**
orcid.org/0000-0002-4000-6947

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## ABSTRACT

**Aims:** The study aimed to evaluate the association between the novel Coronavirus disease-2019 (COVID-19) pandemic and the level of pain, stress, sleep quality, and quality of life in patients with chronic musculoskeletal pain.

**Methods:** This cross-sectional study included patients aged 18-65 years with chronic musculoskeletal pain. Age, gender, body mass index, systemic diseases, dominant pain area, duration of pain, analgesic use, and exercise habit before and after the pandemic were recorded. Participants were asked to evaluate their pain severity and global assessments in the last month and the pre-pandemic period with a visual analog scale (VAS). The Perceived Stress Scale (PSS), The Pittsburgh Sleep Quality Index (PSQI), and The Nottingham Health Profile (NHP) were administered

**Results:** The study included 100 participants (age, mean ± SD: 42.8±12.5 years, female: 69%). Compared with the pre-pandemic period, an increase in pain and global assessment scores, and poorer sleep hygiene in the last month were reported by 82%, 67%, and 66%, respectively. Pain severity VAS score (pre-pandemic: 3.9±2 vs. post-pandemic: 5.9±2.1, $p<0.001$), global assessment VAS score (pre-pandemic: 3.8±2 vs. post-pandemic: 5.6±2.3, $p<0.001$), the proportion of patients using routine analgesics (pre-pandemic: 44% vs. post-pandemic: 52%, $p=0.008$), and the number of routine analgesics (pre-pandemic: 10.4±18.6 vs. post-pandemic: 15.3±24, $p<0.001$) in the last month was significantly more compared to the pre-pandemic period. There were no significant differences in pain score, patient's global assessment score, the number of routine analgesics, PSS-14, PSQI, NHP-1, and NHP-2 scores between subjects with and without a history of COVID-19.

**Conclusions:** In patients with chronic musculoskeletal pain, an increase in pain severity, analgesic use, and deterioration in general well-being were observed during the COVID-19 pandemic. The pronounced changes were not found to be dependent on the history of COVID-19.

## Introduction

Chronic pain is defined as persistent or recurrent pain that lasts longer than three months or exceeds the normal tissue healing time (1). It is evaluated in 7 categories as primary, cancer-related, posttraumatic/post-surgical, neuropathic, visceral, musculoskeletal, and head/orofacial pain (2). Chronic musculoskeletal pain is one of the most common complaints in routine clinical practice (3). The prevalence of chronic pain in the general population is around 20%, and it is a common worldwide condition that causes limitations in daily living activities, disability, and a decrease in quality of life (4-7). It is a clinical picture with high personal, social, and economic burdens (8,9).

Chronic pain is a biopsychosocial model with biological, cognitive, affective, emotional, and social problems (10,11). Many factors, such as demographic factors (such as age and occupation), lifestyle-related factors (such as alcohol use,

smoking, and physical activity), mental health conditions (such as past pain experiences, and traumatic events), physical factors, and genetic factors are associated with the development of chronic pain (11,12).

The novel Coronavirus disease-2019 (COVID-19) pandemic has had negative impacts on chronic pain conditions in many ways (3,5,11,13-16). One of the first conditions associated with COVID-19 is chronic pain that occurs as a component of the postviral syndrome and has been linked to virus-associated organ damage (11). Although COVID-19 infection mainly affects the lungs and internal organs, musculoskeletal system damage is also prevalent (3,15). Pain, particularly myalgia and low back pain, is among the early symptoms of COVID-19 infections (16). Additionally, since most chronic pain patients are at an advanced age and have comorbidities, the risk of COVID-19 is considered to be increased (13,15,16). Restricting the admission to healthcare services due to fear of infection is another situation that supports chronicity in painful situations (16). Other conditions associated with chronic pain in the COVID-19 pandemic are worsening of pre-existing physical or mental complaints and emerging chronic pain due to pandemic-related risk factors such as poor sleep, inactivity, fear, anxiety, and depression in people with no previous chronic pain and a history of COVID-19 (11).

Infection control strategies for pandemics around the world support home isolation (16). Many elective patient examinations and surgical procedures have been postponed, and access to non-emergency healthcare services has been restricted (5,13,16,17). It has become more difficult than ever for patients with chronic pain to access appropriate treatment time in a reasonable time (3,5,13,14,16). Disruptions in the follow-up and treatment of the patients can increase pain, decrease functionality, increase analgesic use, and deteriorate the quality of life (18). Difficulties in access to medical care and isolation can not only have a negative impact on pain management and psychological conditions but also increase the burden of patients with chronic pain (5,16,18). However, life-related psychosocial stressors such as decreased interpersonal relationships, isolation, fear of illness, future anxiety, and financial difficulties brought about by the pandemic may cause pain to exacerbate in patients with chronic pain (19). Thus, pain management is considered particularly important in the COVID-19 pandemic (3).

The aim of this study aimed to evaluate the effects of the COVID-19 pandemic on pain, stress, sleep, and quality of life in patients with chronic musculoskeletal pain and the relationships between them.

## Methods

### Study design and participants

In this single-center, cross-sectional study, patients aged 18-65 years who presented with chronic (more than three months) musculoskeletal pain were consecutively enrolled, between January 2021 and March 2021. The exclusion criteria had a history of trauma and surgical intervention in the last three months, inflammatory rheumatic disease, chronic severe systemic or neurological disease, and moderate to severe impairment of cognitive status determined by the Mini-Mental State test (20). Ethics committee approval was obtained from the institutional review board (Ethics Committee of AYBÜ Yenimahalle Training and Research Hospital, Turkey, decision number/date: 2020-3-16/16.12.2020). The participants provided informed consent, and the study conformed to the principles of the Helsinki Declaration principles were followed (ClinicalTrials.gov Identifier: NCT04878900/04.05.2021).

### Data collection

The primary outcome measures of the study were; general pain severity and global well-being assessment with the visual analog scale (VAS) (21) in the pre-pandemic period and the last month, the Perceived Stress Scale (PSS) (22), the Pittsburgh Sleep Quality Index (PSQI) (23), and the Nottingham Health Profile (NHP) (24) scale scores. Age, gender, body mass index (BMI), and systemic diseases of the participants were recorded as demographic data. Dominant pain area in the musculoskeletal system, duration of pain, routine use of analgesics, and exercise habits before and after the pandemic were recorded. Information about the personal history of COVID-19 or the relatives of the participants was also collected. Then, the participants were asked to evaluate their general pain severity and global well-being assessment with the VAS in the pre-pandemic period and the last month. The patients marked their pain severity on a line of 10 centimeters (cm) with the starting point (0) expressing no pain, and the endpoint (10) indicating the most severe pain experienced in life. On the patient's global assessment scale, the patients marked their global assessment on a line of 10 centimeters (cm) with the starting point (0) expressing very good and the endpoint (10) indicating very bad. The distance between the point marked by the patient and the starting point was measured. The higher the measured value meant the greater the severity of pain and the worse the patient's global assessment (21).

### The Perceived Stress Scale

The PSS is a scale developed by Cohen et al. (22) to evaluate how stressful some situations in life are perceived by the individual. A Turkish validity and reliability study of the scale was conducted by Eskin et al. (25). The long form of the scale consists of 14 items. The situations given in each item are evaluated with a 5-point Likert-type scale (0=never, 1=almost never, 2= sometimes, 3= fairly often, 4= very often). Seven items with positive statements are scored in the reverse. The scale has two short forms consisting of 10 and 4 items. The total score ranges from 0-56 for PSS-14, 0-40 for PSS-10, and

0-16 for PSS-4. The higher the scores, the greater the person's perception of stress (22,25).

### The Pittsburgh Sleep Quality Index

The PSQI is a scale developed by Buysse et al. (23) designed to evaluate sleep quality and disorders. A Turkish validity and reliability study of the scale was conducted by Agargun et al. (26). These consisted of 24 questions. Nineteen questions are self-assessment questions, and five questions are assessment questions made by their spouse or roommate. Questions about the evaluations made by the spouse or roommate are not taken into consideration in the score calculation. Eighteen question items were used for scoring. The scale consists of 7 components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleep medication, and daytime dysfunction. While some components consist of a single question item, some are formed by grouping several items. Each component is scored between 0 and 3 points, and the sum of the component scores gives the total score of the scale. The higher the total score which can vary between 0 and 21, the worse the sleep quality. A total score greater than 5 indicates poor sleep quality (23,26).

### The Nottingham Health Profile

The NHP is a general health status scale developed by the European Group for Quality of Life and Health Measurement that evaluates perceived problems in physical, emotional, and social areas and how these problems affect daily activities (24). The adaptation study of the scale to Turkish was published by Kücükdeveci et al. (27). The questions in the first part of the scale are about the health status of the people, and the questions in the second part are about the effects of their health status on daily life. The first part consists of 38 items in which each item is marked yes or no. This section has 6 sub-dimensions: pain, emotional reactions, sleep, social isolation, and physical mobility and energy. Each question in the sub-dimensions has a different score weight, and each sub-dimension is scored between 0 and 100. The sum of all sub-scores gives the total score of the first part of the scale. The higher the score, the worse the perception of quality of life regarding health status. The second part consists of 7 items that question whether there are problems in the daily life areas that are most probably affected by the health condition of the person, such as work-life, housework, social life, interpersonal relationships, sexual life, hobbies, and holidays, each item is marked yes or no (24).

### Statistical Analyses

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) Statistics for Windows, version 20.0 (IBM Corp., Armonk, NY). The conformity of the variables to normal distribution was examined by visual (histogram and probability charts) and analytical methods (Kolmogorov-Smirnov/Shapiro-Wilk's) and the homogeneity of variances using the Levene test. In descriptive analyses, continuous variables were expressed as mean and standard deviation, and categorical variables as numbers and percentages. In comparisons between dependent groups, the dependent groups' t-test was used for numerical data that met parametric test conditions, the Wilcoxon test for data that did not, and McNemar's test for categorical data. Mann-Whitney U test was used for numerical data, and the chi-square test was used for categorical data in comparisons between independent groups. To examine the relationships between variables, 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 conform to the normal distribution. Possible risk factors for increased pain severity, patients' global assessment, and poor sleep quality were analyzed using logistic regression analysis. The model fit assessment was made using the Hosmer-Lemeshow test. The statistical significance level was accepted as p=0.05.

## Results

### Basic characteristics

The study included 100 participants (age, mean ± SD: 42.8±12.5 years, female: 69%). In the last month, compared with the pre-pandemic period, 82% of the patients had an increase in their pain scores, 67% of the patients had an increase in the patients' global assessment scores, and 65.9% of the patients who used routine analgesics (29% of all patients) had an increase in the number of analgesics they used routinely. The body areas where the pain was most dominant were low back in 31, neck in 20, lower extremity in 19, upper back in 17, and upper extremity in 13 patients. While 16% of the patients had a personal history of COVID-19 and 13% of their relatives, 71% were free of COVID-19 history. There was a history of systemic disease in 28% of the patients. There was asthma in 5% (n=5), diabetes mellitus in 8% (n=8), hypertension in 13% (n=13), and coronary artery disease in 3% (n=3). The basic characteristics are shown in Table 1.

### Outcome analyses

In the last month, compared to the pre-pandemic period, the pain severity VAS score ($p<0.001$), the patient's global assessment VAS score ($p<0.001$), the number of patients using routine analgesics ($p=0.008$), and the number of routine analgesics ($p<0.001$) were significantly higher. The number of patients who exercised regularly in the pre-pandemic period was significantly higher than the number of patients who exercised regularly in the last month ($p=0.02$). The comparison results of the variables in the pre-pandemic period and the last month are given in Table 2.

In 66% of the patients, the PSQI score was above five, which indicates poor sleep quality. Descriptive results for the scales included in the study are given in Table 1.

There were no statistically significant differences between patients with and without a personal history of COVID-19 or in their relatives in terms of age, gender, BMI, pain duration,

**Table 1. Basic characteristics and descriptive results of the scales**

| | |
|---|---|
| **Age-years, mean±SD (range)** | 42.8±12.5 (23-65) |
| **Gender, n (%)** | |
| Female | 69 (69) |
| Male | 31 (31) |
| **BMI-kg/m$^2$, mean±SD (range)** | 26.1±5.3 (18.5-48.8) |
| **Systemic disease history, n (%)** | |
| Yes | 28 (28) |
| No | 72 (72) |
| **Pain duration-months, mean±SD (range)** | 52.6±51.8 (12-240) |
| **COVID-19 history, n (%)** | |
| No | 71 (71) |
| COVID-19 history in the person | 16 (16) |
| COVID-19 history in the person's relatives | 13 (13) |
| **Increase in the pain score, n (%)** | |
| Yes | 82 (82) |
| No | 18 (18) |
| **Increase in the patient's global assessment score, n (%)** | |
| Yes | 67 (67) |
| No | 33 (33) |
| **Increase in the amount of routine analgesics, n (%)** | |
| Yes | 29 (29) |
| No | 15 (15) |
| **PSS, mean±SD (range)** | |
| - PSS-14 | 25.1±7.7 (6-46) |
| - PSS-10 | 18±5.9 (4-34) |
| - PSS-4 | 6.9±2.8 (0-14) |
| **PSQI, mean±SD (range)** | |
| - Subjective sleep quality | 1.4±0.7 (0-3) |
| - Sleep latency | 1.5±1 (0-3) |
| - Sleep duration | 1±0.8 (0-3) |
| - Habitual sleep efficiency | 0.5±0.8 (0-3) |
| - Sleep disturbance | 1.6±0.6 (0-3) |
| - Use of sleep medication | 0.2±0.7 (0-3) |
| - Daytime dysfunction | 1.1±0.9 (0-3) |
| - Total | 7.4±3.3 (1-17) |
| **PSQI >5, n (%)** | |
| - Yes | 66 (66) |
| - No | 34 (34) |
| **NHP-1, mean±SD (range)** | |
| - Pain | 40.6±30.9 (0-100) |
| - Emotional reactions | 28.2±32.3 (0-100) |
| - Sleep | 30±31 (0-100) |
| - Social isolation | 15.8±25.7 (0-100) |
| - Physical mobility | 20.1±21 (0-88.5) |
| - Energy | 34.6±39.4 (0-100) |
| - Total | 168.7±125.3 (0-479.8) |
| **NHP-2, mean±SD (range)** | 1.5±1.9 (0-7) |

BMI: Body mass index, COVID-19: Coronavirus disease-2019, PSS: Perceived Stress Scale, PSQI: Pittsburgh Sleep Quality Index, NHP: Nottingham Health Profile, SD: Standard deviation

last month vs. pre-pandemic differences in pain score, patient's global assessment score, the number of routine analgesics, PSS-14 score, PSQI total score, NHP-1, and NHP-2 scores. Among patients without a personal history of COVID-19 or in their relatives, PSQI-sleep time (p=0.05), PSQI-sleep disorder (p=0.05), NHP-1-sleep duration (p=0.02), and NHP-1-physical (p=0.02) sub-scores were significantly higher compared to the participants any history of COVID-19. There were no statistically significant differences between other sub-scores of the scales between the groups (all p>0.05). The number of participants with a history of systemic disease was statistically significantly higher than the group without a personal history of COVID-19 or in their relatives compared to the participants with any history of COVID-19 (p=0.02). The results of the comparison of variables between the groups with and without a personal history of COVID-19 or in their relatives are given in Table 3.

There were strong positive correlations between the differences in pain score and patient's global assessment score (r=0.71, p<0.001). A moderate positive correlation between NHP-1 total score and NHP-2 score (r=0.60, p<0.001); age and BMI (r=0.53, p<0.001); PSS-14 score and NHP-1 score (r=0.58, p<0.001) and PSQI total score and NHP-1 total score (r=0.52, p<0.001) were also observed. Other correlations between the evaluated variables were low or insignificant level or statistically insignificant (Table 4).

**Table 2. The comparison of variables between the pre-pandemic period and the last month**

| | Pre-pandemic period | Last month | p |
|---|---|---|---|
| Pain severity VAS score, mean±SD (range) | 3.9±2 (0-7) | 5.9±2.1 (1-10) | **<0.001*** |
| Patient's global assesment VAS score, mean±SD (range) | 3.8±2 (0-10) | 5.6±2.3 (0-10) | **<0.001*** |
| Presence of using routine analgesics, n (%)<br>Yes<br>No | <br>44 (44)<br>56 (56) | <br>52 (52)<br>48 (48) | **0.008*** |
| Number of analgesics/month, mean±SD (range) | 10.4±18.6 (1-90) | 15.3±24 (1-120) | **<0.001*** |
| Regular exercise, n (%)<br>Yes<br>No | <br>32<br>68 | <br>22<br>78 | **0.020*** |

*Statistical significance level p=0.05.
VAS: Visual analog scale, SD: Standard deviation

**Table 3. Comparisons of variables between the groups with and without a personal of COVID-19 or in their relatives**

| | COVID-19 history (+) | COVID-19 history (+) | p |
|---|---|---|---|
| Age-years, mean±SD (range) | 39.5±12.4 (23-65) | 44.1±12.4 (23-65) | 0.06 |
| Gender, n (%)<br>Female<br>Male | <br>18 (62.1)<br>11 (37.9) | <br>51 (71.8)<br>20 (28.2) | 0.34 |
| BMI-kg/m$^2$, mean±SD (range) | 24.8±3.1 (18.5-31.3) | 26.6±5.9 (18.7-48.8) | 0.19 |
| Presence of systemic disease history, n (%)<br>Yes<br>No | <br>13 (44.8)<br>16 (55.2) | <br>15 (21.1)<br>56 (78.9) | **0.02*** |
| Pain duration-months, mean±SD (range) | 51.3±56.8 (12-240) | 53.1±50 (12-240) | 0.88 |
| Difference in pain scores, mean±SD (range) | 1.3±1.9 [(-4.3)-(4.4)] | 2.3±2.2 [(-2.7)-(7)] | 0.09 |
| Difference in patient's global assessment scores, mean±SD (range) | 1.2±1.9 [(-4.2)-(6)] | 1.9±2.3 [(-2)-(8)] | 0.22 |
| Difference in the amount of routine analgesics, mean±SD (range) | 9.3±13.6 (0-30) | 3.2±5.6 (0-30) | 0.89 |
| PSS-14, mean±SD (range) | 25.6±7.7 (10-40) | 25±7.7 (6-46) | 0.71 |
| PSQI total, mean±SD (range) | 6.8±2.7 (2-13) | 7.6±3.5 (1-17) | 0.33 |
| NHP-1, mean±SD (range) | 135.9±116.5 (0-382.7) | 182.1±127.1 (0-479.8) | 0.07 |
| NHP-2, mean±SD (range) | 1.4±2.1 (0-7) | 1.5±1.8 (0-7) | 0.27 |

*Statistical significance level p=0.05.
COVID-19: Coronavirus disease-2019, BMI: Body mass index, PSS: Perceived Stress Scale, PSQI: Pittsburgh Sleep Quality Index, NHP: Nottingham Health Profile, SD: Standard deviation

**Table 4.** Correlation analysis among the study variables

| | Age | BMI | Difference in pain scores | Difference in patient's global assessment scores | Difference in the amount of routine analgesics | PSS-14 score | PSQI total score | NHP-1 total score | NHP-2 total score |
|---|---|---|---|---|---|---|---|---|---|
| Age | | **r=0.53 p<0.001**** | r=0.09 p=0.39 | r=0.04 p=0.66 | r=0.004 p=0.98 | r=-0.09 p=0.35 | r=-0.09 p=0.39 | r=0.12 p=0.21 | r=0.19 p=0.06 |
| BMI | **r=0.53 p<0.001**** | | r=0.14 p=0.16 | r=0.06 p=0.56 | r=-0.19 p=0.21 | r=-0.07 p=0.46 | r=0.01 p=0.89 | **r=0.21 p=0.04*** | r=0.13 p=0.19 |
| Difference in pain scores | r=0.09 p=0.39 | r=0.14 p=0.16 | | **r=0.71 p<0.001**** | r=0.29 p=0.05 | **r=0.20 p=0.05*** | r=0.13 p=0.20 | **r=0.26 p=0.008*** | **r=0.22 p=0.03*** |
| Difference in patient's global assesment score | r=0.04 p=0.66 | r=0.06 p=0.56 | **r=0.71 p<0.001**** | | **r=0.32 p=0.03*** | **r=0.27 p=0.006**** | **r=0.21 p=0.04*** | **r=0.29 p=0.003**** | **r=0.26 p=0.009**** |
| Difference in the amount of routine analgesics | r=0.004 p=0.98 | r=-0.19 p=0.21 | r=0.29 p=0.05 | **r=0.32 p=0.03*** | | r=0.16 p=0.30 | r=0.29 p=0.05 | r=0.21 p=0.17 | **r=0.33 p=0.03*** |
| PSS-14 score | r=-0.09 p=0.35 | r=-0.07 p=0.46 | **r=0.20 p=0.05*** | **r=0.27 p=0.006**** | r=0.16 p=0.30 | | **r=0.38 p<0.001**** | **r=0.58 p<0.001**** | **r=0.40 p<0.001**** |
| PSQI total score | r=-0.09 p=0.39 | r=0.01 p=0.89 | r=0.13 p=0.20 | **r=0.21 p=0.04*** | r=0.29 p=0.05 | **r=0.38 p<0.001**** | | **r=0.52 p<0.001**** | **r=0.28 p=0.004**** |
| NHP-1 total score | r=0.12 p=0.21 | **r=0.21 p=0.04*** | **r=0.26 p=0.008*** | **r=0.29 p=0.003**** | r=0.21 p=0.17 | **r=0.58 p<0.001**** | **r=0.52 p<0.001**** | | **r=0.60 p<0.001**** |
| NHP-2 total score | r=0.19 p=0.06 | r=0.13 p=0.19 | **r=0.22 p=0.03*** | **r=0.26 p=0.009**** | **r=0.33 p=0.03*** | **r=0.40 p<0.001**** | **r=0.28 p=0.004**** | **r=0.60 p<0.001**** | |

Statistical significance level of the correlation. *p=0.05 (2-tailed) and **p=0.01 (2-tailed).
BMI: Body mass index, PSS: Perceived Stress Scale, PSQI: Pittsburgh Sleep Quality Index, NHP: Nottingham Health Profile, SD: Standard deviation, COVID-19: Coronavirus disease-2019

Logistic regression analyses indicated that the increase in the patient's global assessment score was a significant risk factor [Odds ratio: (OR): 2.7 95% confidence interval (CI): 1.5-5, p=0.001] for the increase in pain score (in any amount) in the last month compared with the pre-pandemic period (Table 5). Age, gender, BMI, presence of systemic disease, history of COVID-19, duration of pain, decrease in exercise (reported by the patient), PSS-14 score, and PSQI total score were not independently associated with increased pain score in the post-pandemic period. Additionally, the increase in the pain score was a statistically significant risk factor [OR: 2.1 (95% CI): 1.5-3, p<0.001] for the increase in the patient's global assessment score (in any amount) in the last month compared to the pre-pandemic (Table 5). Age, gender, BMI, presence of systemic disease, history of COVID-19, duration of pain, decrease in exercise, PSS-14 score, and total PSQI score were not independently associated with an increased patient's global assessment score in the post-pandemic period. Also, advanced age was a statistically significant risk factor [OR: 0.95 (95% CI): 0.90-1, p=0.04] for poor sleep quality, which was determined by the total PSQI value greater than 5 (Table 5). Gender, BMI, presence of systemic disease, COVID-19 history, pain duration, decrease in exercise, PSS-14 score, increases in the pain severity score, and the patient's global assessment score in the last month was not independently associated with poor sleep quality.

## Discussion

In this study, among patients with chronic musculoskeletal pain, we found an increase in pain scores and global assessment scores by 82% and 67%, respectively, in the last month compared to the pre-pandemic period. Moreover, 65.9% of the patients who used routine analgesics showed an increase in the number of analgesics they used routinely. The pain severity VAS scores the patient's global assessment VAS score, and routine analgesics use were significantly higher in the last month compared to the pre-pandemic period. The PSQI score was above 5, which indicated poor sleep quality in 66% of the participants. Several authors have emphasized that the pandemic and

**Table 5. Logistic regression analysis**

| | Increase in pain score | | Increase in the patient's global assessment score | | Poor sleep quality | |
|---|---|---|---|---|---|---|
| Risk factors | OR (95% CI) | p | OR (95% CI) | p | OR (95% CI) | p |
| Increase in pain score | - | - | 2.1 (1.5-3.0) | **<0.001** | - | - |
| Increase in the patient's global assessment score | 2.7 (1.5-5.0) | **0.001** | - | - | - | - |
| Age | - | - | - | - | 0.95 (0.90-1.0) | **0.04** |

OR: Odds ratio, CI: Confidence intervals (only the significant associates are shown)

quarantine measures leading to social isolation have brought an increase in pain, sedentariness, mood disorders, fatigue, and the need for analgesics in patients with chronic pain (28-32). Among patients with rheumatic pain, 37.4% had worsening disease activity assessed by pain, stiffness, and fatigue, and 75.7% had emotional disturbances during the COVID-19 pandemic. Similar to our study, when only non-inflammatory conditions are considered, worsening in pain was reported in 50% and mood disturbances in 74% in cases of osteoarthritis/osteoporosis, whereas worsening in pain was reported in 63.6%, mood worsening in 87.7% in cases of fibromyalgia (33). In another study, Nieto et al. (34) reported that 70.8% of chronic pain patients had an increase in general pain severity, 79.1% experienced deterioration in sleep, and 79.9% had deterioration in physical activity during the pandemic period. Lacasse et al. (30) evaluated the effects of the COVID-19 pandemic on pharmacological, physical, and psychological pain treatments in patients with chronic pain and demonstrated that 38.3% of the patients made some changes in their pharmacological treatments, and in 40.5% of these individuals, the underlying cause was reported as COVID-related conditions. The most common reported cause (in 11.5%) was worsening of pain. We observed that there was an increase in routine analgesic use during the pandemic period compared with the pre-pandemic period. Similarly, in a study by López-Medina et al. (33), non-steroidal anti-inflammatory drug use was significantly higher in the group with worsening rheumatic disease activity. In summary, when the results of our study and the sample studies mentioned are evaluated together, it can be said that the pandemic process has negative effects on the chronic pain picture.

Lacasse et al. (30) reported that restricting access to exercise opportunities in patients with chronic pain was the most common reason for the change in physical therapy components of patients with chronic pain (30). Similarly, in our study, the proportion of patients who exercised regularly in the pre-pandemic period was significantly higher than the proportion of patients who exercised regularly in the last month. In other words, it can be said that the pandemic process affects exercise habits negatively.

We observed that the only statistically significant risk factor for the pain score increase in the last month compared to the pre-pandemic period was the patient's global assessment score increase, for the patient's global assessment score increase in the last month compared to the pre-pandemic period was the pain score increase, for the poor sleep quality was advanced age. Age, gender, BMI, presence of systemic disease, history of COVID-19, duration of pain, decrease in exercise, PSS-14 score, and PSQI total score were not found to be significant risk factors for the pain score increase, the patient's global assessment score increase,and the poor sleep quality. Different results have been reported in the literature regarding the relationships between factors associated with chronic pain. In the study of Nieto et al. (34), it was reported that there were relationships between sleep problems and physical activity change, general well-being, mood, changes in pain, and disability; but there were no significant relationships between sleep problems and age, pain duration. López-Medina et al. (33) stated that, when examined, the factors related to disease activity in rheumatic pain, lack of exercise, anxiety, or feeling sad were statistically significant risk factors, while age and gender were not significant risk factors. In the study by Lacasse et al. (30), they reported that the change in pain severity during the pandemic period, the presence of psychological stress symptoms, and the change in physical treatment modalities including exercise practices were related to the change in pharmacological pain treatments, while pain duration, COVID-19 history, age, and gender were not found to be significant risk factors.

In our study, we observed that high perceived stress and low sleep quality were not significant risk factors for an increase in chronic pain. Similarly, in the study of Nieto et al. (34), it was reported that while stress and sleep disorders were reported more frequently as pain triggers in the pre-pandemic period, future anxiety, feeling of insecurity, negative thoughts, sadness, loneliness, sedentariness, and fear of infecting COVID-19 were reported more frequently as pain triggers during the pandemic period. In contrast, Shevlin et al. (35) reported that COVID-19-related anxiety was positively correlated with general anxiety and the severity of somatic symptoms, including pain and fatigue. The reason why we observed that they did not have significant effects on pain increases during the pandemic process may be that sleep and stress disorders are already common in chronic painful conditions.

A review by Clauw et al. (11) emphasized that the COVID-19 pandemic would inevitably increase chronic pain because it is a stressful life event. Life-related psychosocial stressors such as reduction in interpersonal relationships, isolation, fear of illness, anxiety for the future, and financial difficulties, which are the consequences of the pandemic, may cause exacerbation of pain in patients with chronic pain (19). In our study, we observed that there were no significant differences between the participants with or without a personal history of COVID-19 or in their relatives in terms of the pain score difference, patient's global assessment score, and the number of routine analgesics differences between the last month and the pre-pandemic period. This suggests that psychosocial stressors that come with the pandemic process, rather than the COVID-19 disease history, are the main factors affecting chronic painful conditions.

Our study has some limitations. First, the retrospective evaluation of the pain severity and global assessment of the participants for the pre-pandemic period may have reduced the reliability of the relevant data. Second, among the problems related to the mood that may affect chronic pain, only anxiety was evaluated. Finally, the evaluation of general anxiety, not COVID-19-specific anxiety, is another limitation of the study. There is a need for studies that will more comprehensively evaluate the psychological and socio-economic problems brought about by the COVID-19 pandemic. These studies will be able to provide clearer information about the points to be considered in pain management in patients with chronic pain during the pandemic period.

## Conclusion

In patients with chronic musculoskeletal pain, there was an increase in pain severity and analgesic use and deterioration in general well-being during the COVID-19 pandemic. These effects were independent of the history of COVID-19 in patients with chronic musculoskeletal pain.

### Ethics

**Ethics Committee Approval:** Ethics committee approval was obtained from the Institutional Review Board (Ethics Committee of AYBÜ Yenimahalle Training and Research Hospital, Turkey, decision number/date: 2020-3-16/16.12.2020).

**Informed Consent:** Retrospective study.

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

### Authorship Contributions

Surgical and Medical Practices: E.B.G., M.Ç.Ö., A.U., S.A., Concept: E.B.G., M.Ç.Ö., A.U., S.A., Design: E.B.G., M.Ç.Ö., A.U., S.A., Data Collection or Processing: E.B.G., M.Ç.Ö., A.U., S.A., Analysis or Interpretation: E.B.G., M.Ç.Ö., A.U., S.A., Literature Search: E.B.G., M.Ç.Ö., A.U., S.A., Writing: E.B.G., M.Ç.Ö., A.U., S.A.

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