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RESEARCH ARTICLE

Examination of the relationship between musculoskeletal system disorders and stress levels in students at the university of health sciences

Sağlık bilimleri üniversitesi öğrencilerinde kas iskelet sistemi bozuklukları ile stres düzeyi arasındaki ilişkinin incelenmesi

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Abstract

Aim: Musculoskeletal disorders (MSDs) are a common health problem among individuals. It is thought that this disorder may be related to stress in university students. This study aimed to investigate the relationship between MSDs and perceived stress levels (PSL) among students at the University of Health Sciences.

Methods: This study, including 90 undergraduate students at Kütahya University of Health Sciences. Data were collected using a demographic information form, the Cornell Musculoskeletal Discomfort Questionnaire (CMDQ), and the Perceived Stress Scale (PSS-14). The students were divided into three groups according to their departments (Physiotherapy and Rehabilitation; n=31, Occupational Therapy; n=30, Nursing; n=29) and compared in terms of MSDs and PSL. Statistical analysis was performed using SPSS 25, including ANOVA for group comparisons and Pearson correlation analysis to examine associations.

Results: The participants 78.9% were female. The average PSL score was 20.88±4.83. No significant difference was found in PSL among academic departments (p>0.05). However, occupational therapy students reported significantly higher back and knee pain, as well as overall CMDQ scores (p<0.05). A significant positive correlation was identified between PSL and overall musculoskeletal discomfort (r=0.305, p=0.003), with the strongest association observed between stress and neck pain (r=0.402, p<0.001).

Conclusion: MSDs are associated with stress in health sciences students. These findings highlight the need for ergonomic training and stress management strategies to promote physical and mental well-being in this population.

Keywords: Musculoskeletal disorders, pain, stress, university students.

Özet

Amaç: Kas iskelet sistemi bozuklukları (KİSB), bireylerde yaygın görülen bir sağlık sorunudur. Üniversite öğrencilerinde bu bozukluğun stresle ilişkili olabileceği düşünülmektedir. Bu çalışma, Sağlık Bilimleri Üniversitesi öğrencilerinde KİSB ile algılanan stres düzeyi arasındaki (ASD) ilişkiyi değerlendirmeyi amaçlamaktadır.

Yöntemler: Bu çalışmaya, Kütahya Sağlık Bilimleri Üniversitesi'nde öğrenim gören 90 sağlık bilimleri öğrencisi dahil edilmiştir. Katılımcılara demografik bilgi formu, Cornell Kas-İskelet Sistemi Bozuklukları Anketi (CMDQ) ve Algılanan Stres Ölçeği (ASÖ-14) uygulanmıştır. Öğrenciler, bölümlerine göre üç gruba ayrılarak (Fizyoterapi ve Rehabilitasyon; n=31, Ergoterapi; n=30, Hemşirelik; n=29) KİSB ve ASD yönünden karşılaştırılmıştır. Veriler SPSS 25 programı ile analiz edilmiş, gruplar arası farklılıklar için ANOVA ve ilişki analizleri için Pearson korelasyonu kullanılmıştır.

Bulgular: Katılımcıların %78,9'u kadındır. ASD ortalaması 20,88±4,83'tür. Bölümler arasında ASD açısından anlamlı fark saptanmamıştır (p>0,05). Ancak sırt ve diz ağrıları ile toplam CMDQ puanı açısından ergoterapi öğrencilerinde istatistiksel olarak anlamlı daha yüksek değerler bulunmuştur (p<0,05). ASD ile KİSB toplam skoru arasında pozitif yönlü anlamlı bir ilişki saptanmıştır (r=0,305, p=0,003); özellikle boyun ağrısı ile stres arasındaki ilişki en güçlü düzeydedir (r=0,402, p<0,001).

Sonuç: Sağlık bilimleri öğrencilerinde KİSB, stres ile ilişkilidir. Bu bulgular, öğrencilere yönelik ergonomi eğitimi ve stres azaltıcı müdahalelerin önemini vurgulamaktadır.

Anahtar Kelimeler: Kas-iskelet sistemi bozuklukları, ağrı, stres, üniversite öğrencileri.

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INTRODUCTION

Musculoskeletal disorders (MSDs) are a common health problem that significantly affects the quality of life, physical functions and psychosocial health of individuals. Health sciences students, in particular, are at high risk for MSDs due to prolonged static postures, repetitive movements, and hands-on training processes (1,2). These disorders can negatively affect academic performance and clinical practice skills by causing pain, movement limitations, and functional losses (3).

Pain is defined by the International Association for the Study of Pain (IASP) as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage"(4). Chronic pain, especially when it persists for more than 6 months, can occur through nociceptive, neuropathic, or mixed mechanisms and can cause sensitization in the central nervous system (5). Musculoskeletal pain is frequently seen in students in the lower back, neck, shoulders, and extremities, and this condition is closely associated with non-ergonomic working conditions and stress (6).

Stress is defined as a situation that disrupts the physical and psychological balance of an individual and requires adaptation (7). Academic stress is particularly common among health sciences students due to heavy course loads, clinical practice, and exam anxiety (8). Chronic stress can exacerbate pain perception by increasing muscle tension and contribute to the development of musculoskeletal disorders (9). Furthermore, hormonal changes associated with stress (such as increased cortisol) can trigger an inflammatory response, worsening pain processes (10).

Although there are numerous studies in the literature examining the relationship between MSDs and stress in healthcare workers, studies investigating this relationship in detail in the student population are limited (11,12). This study aims to evaluate the prevalence of musculoskeletal disorders and their relationship with stress levels in students of Health Sciences University. The findings may contribute to the development of ergonomic and psychological interventions to protect the physical and mental health of students.

METHODS

Study Population and Data Collection

This cross-sectional study evaluated fourth-year students aged 21 to 24 who were studying at the University of Health Sciences, Kütahya (KSBU) and participating in practical training. Data collection took place between May 1, 2025 and June 1, 2025. The Kutahya Health Sciences University Non-Interventional Research Ethics Committee approved the study in May 06, 2025 with decision number 2025/06-28.

Inclusion Criteria

- Those actively studying in the Physiotherapy, Occupational Therapy or Nursing departments at KSBU,
- Those between the ages of 21-24,
- Those actively participating in professional practice training.

Exclusion Criteria

- Those studying in departments other than Physiotherapy, Occupational Therapy and Nursing,
- Those with a systemic disease (rheumatological, neurological, etc.) or a psychiatric diagnosis,
- Those who refused to participate in the study.

Data from all health sciences faculty students who met the inclusion criteria specified above were included in the study. Demographic information, including age, weight, height, pain duration, and other characteristics of the included individuals, was recorded on a pre-generated data collection form. Then, data on individuals' musculoskeletal disorders and perceived stress levels, collected through the scales described below, were recorded on the data collection form. The individuals were then divided into three groups: nursing, occupational therapy, and physical therapy and rehabilitation students and appropriate statistical analyses were conducted based on these groups. In this study, two different measurement tools, detailed below, were used to assess participants' musculoskeletal disorders and perceived stress levels.

Turk J Clin Res. 2025;1(2):101-107
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Cornell Musculoskeletal Disorders Questionnaire (CMDQ)

The Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) was used to assess musculoskeletal disorders. This questionnaire assesses the frequency and severity of discomfort felt in 20 different anatomical regions (e.g., neck, shoulder, low back, wrist, etc.) during the past week, and the impact of these discomforts on daily functioning (13). Frequency is scored as "never" (0), "1-2 times" (1.5), "3-4 times" (3.5), "once every day" (5), and "many times every day" (10); severity is scored as "mild" (1), "moderate" (2), and "severe" (3); and functional impact is scored as "none" (1), "partial" (2), and "marked" (3). The total score for each anatomical region is calculated by multiplying frequency, severity and functional impact, and scores range from 0 to 90. The Turkish validity and reliability study of the questionnaire was conducted by Erdinç et al. (2011) (14).

Perceived Stress Scale (PSS-14)

The Perceived Stress Scale (PSS-14) was used to determine the stress levels of the participants. This scale was developed by Cohen, Kamarck, and Mermelstein (1983) and consists of 14 items (15). Each item is answered on a 5-point Likert-type scale (0: Never–4: Very often), and the total score ranges from 0 to 56. The seven positive statements on the scale are reverse-coded. Higher scores indicate that the individual perceives higher levels of stress. The Turkish validity and reliability study of the scale was conducted by the Menderes University Faculty of Medicine (16).

Statistical Analysis

All data were analyzed using the IBM SPSS Statistics 25 (SPSS Inc., Chicago, IL) package program. Quantitative demographic data of the participants were shown with mean and standard deviation values, along with minimum and maximum values. Categorical data were reported as number (n) and percentage (%). The normal distribution of the data between groups was examined using skewness-kurtosis coefficients. Normality was considered to be achieved if skewness-kurtosis values were between -2 and +2. Participants were divided into three groups according to their undergraduate program (physiotherapy and rehabilitation, occupational therapy and nursing). To examine the differences in musculoskeletal pain among these three groups, one-way analysis of variance (One-way ANOVA) was used because the data were normally distributed. In the significant F test, the Games-Howell post hoc procedure was applied to determine which group the difference originated from, as the groups were not homogeneously distributed. Considering that the data showed a normal distribution, Pearson correlation analysis was used to examine whether there was a relationship between perceived stress scale scores and musculoskeletal pain. Correlation coefficients were used to examine the relationship between these two variables. Accordingly, correlation coefficient values of 0.90 and above were interpreted as "very strong relationship," values between 0.70 and 0.89 as "strong relationship," values between 0.40 and 0.69 as "moderate relationship," values between 0.10 and 0.39 as "weak relationship," and values below 0.10 as "very weak relationship." The level of significance was accepted as $p<0.05$ in all analyses.

RESULTS

A total of 90 health sciences undergraduate students with a mean age of 22.35 years participated in the study. 21.1% of the participants were male (n=19), and 78.9% were female (n=71). 34.4% of the participants were studying in the Physiotherapy and Rehabilitation department, 34.3% in the Occupational Therapy department, and 34.2% in the Nursing department. The class distribution showed that 64.5% were fourth-year students, 24.4% were third-year students, and 11.1% were second-year students. The average perceived stress level of all participants was determined to be 20.88±4.83. The highest mean total Cornell score for musculoskeletal pain was found to be 126.32±214.24. Regionally, the highest scores were reported in the neck (13.52±20.83), back (12.06±19.46) and low back (10.36±20.83) regions, respectively.

No statistically significant difference was found in terms of stress levels among the undergraduate departments in which the students studied (p=0.590). Similarly, neck, shoulder, and low back pain scores did not differ significantly between departments (p>0.05). However, significant differences were found between departments for back (p=0.009), right knee (p=0.042), left knee (p=0.050), and overall Cornell total score (p=0.046). According to post hoc analyses, it was observed that

Turk J Clin Res. 2025;1(2):101-107
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Table 1. Demographic characteristics of all participants

	X±SD (n=90)
Age (years)	22.35±1.32
Gender	n (%)
Male	19 (21.1)
Female	71 (78.9)
Department	
Physiotherapy and Rehabilitation	31 (34.4)
Occupational Therapy	30 (34.3)
Nursing	29 (34.2)
Class	
2nd Grade	10 (11.1)
3rd Grade	22 (24.4)
4th Grade	58 (64.5)
	X±SD
PSS	20.88±4.83
CMDQ	
Cornell Neck Score	13.5±20.83
Cornell Right Shoulder Score	9.14±16.46
Cornell Left Shoulder Score	7.37±16.68
Cornell Back Score	12.06±19.46
Cornell Low Back Score	10.36±20.83
Cornell Right Knee Score	6.66±19.34
Cornell Left Knee Score	6.48±16.04
Cornell Total Score	126.32±214.236

n: number of people, X: mean value, SD: standard deviation, PSS: Perceived Stress Scale, CMDQ: Cornell Musculoskeletal Discomfort Questionnaire, %: percentage value

Table 2. Distribution of stress levels and musculoskeletal pain by department

	Physiotherapy and Rehabilitation (n=31)	Occupational Therapy (n=30)	Nursing (n=29)	p
	X±SD	X±SD	X±SD	
PSS	21.39±3.03	21.07±5.63	20.13±4.83	0.590
CMDQ				
Cornell Neck Score	11.64±17.65	19.93±30.16	8.83±5.73	0.101
Cornell Right Shoulder Score	9.90±18.53	10.65±20.06	6.75±8.22	0.635
Cornell Left Shoulder Score	7.59±17.47	10.51±22.23	3.86±4.61	0.311
Cornell Back Score	7.30±7.83	20.80±30.18	8.10±8.43	0.009*
Cornell Low Back Score	10.08±22.09	14.63±27.06	6.22	0.303
Cornell Right Knee Score	5.69±17.85	12.76±27.16	1.37±3.69	0.042*
Cornell Left Knee Score	3.19±9.14	12.20±24.44	4.07±7.52	0.050*
Cornell Total Score	82.45±111.49	207.50±386.20	89.24±15.04	0.046*

n: number of people, X: mean value, SD: standard deviation, PSS: Perceived Stress Scale, CMDQ: Cornell Musculoskeletal Discomfort Questionnaire, p: significance value

these differences were associated with higher pain scores, especially in occupational therapy students.

According to the results of Pearson correlation analysis, a positively and significant relationship was found between perceived stress level and general musculoskeletal pain (r=0.305, p=0.003). The strongest regional correlation between stress and musculoskeletal pain was found with neck pain (r=0.402, p<0.001). Additionally, weak but significant relationships were found between stress level and pain in the right shoulder (r=0.265, p=0.012), left shoulder (r=0.225, p=0.033), back (r=0.233, p=0.027), low back (r=0.252, p=0.017), right knee (r=0.280, p=0.007), and left knee (r=0.258, p=0.014).

Table 3. Relationships between perceived stress and musculoskeletal pain

		Neck Pain	Right Shoulder Pain	Left Shoulder Pain	Back Pain	Low Back Pain	Right Knee Pain	Left Knee Pain	General Musculoskeletal System Pain
PSS Score	**r**	0.402**	0.265*	0.225*	0.233*	0.252*	0.280*	0.258*	0.305*
	p	<0.001	0.012	0.033	0.027	0.017	0.007	0.014	0.003
	n	90	90	90	90	90	90	90	90

*PSS: Perceived Stress Scale, r: correlation coefficient, p: significance value, n=number of participants, *: p<0.05*

Turk J Clin Res. 2025;1(2):101-107
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DISCUSSION

This study was conducted to examine the relationship between musculoskeletal system disorders (MSDs) and perceived stress levels among students at a Health Sciences University. The results showed that 78.9% of the students were female, and the average age was 22.35. This demographic distribution is consistent with similar studies and reflects the high proportion of female students in the health sciences field (17).

In the study, the highest pain scores were detected in the neck (13.52%), back (12.06%) and low back (10.36%) regions. These results suggest that long-term static postures, physical load in clinical practices and non-ergonomic working conditions trigger pain in these regions (18). The higher prevalence of back and knee pain, especially in occupational therapy students, can be explained by the fact that repetitive movements and patient transfers are more common in the clinical practices of this department (19). Additionally, the intensity of academic activities may also pose a risk for pain. A study by Leggatt et al. (20) examined low back pain in occupational therapy students over a one-year period and reported that weekly computer use, along with the year of study, were among the risk factors. Therefore, various interventions are recommended for musculoskeletal pain. These include physical exercise (21), pain education (22) and ergonomic training (23). Students can achieve pain relief through these multidisciplinary interventions. However, it is important to remember that physical exercise and pain education should be tailored to the individual (21) or field (22).

The participants' mean stress score was 20.88±4.83. This value shows that stress is at a moderate level among health sciences students (24). Pearson correlation analysis revealed a significant positive relationship between stress and general MSDs ($r=0.305$, $p=0.003$). Particularly noteworthy is the correlation between neck pain and stress ($r=0.402$, $p<0.001$). This result supports the hypothesis that stress causes neck and upper extremity pain by increasing muscle tension (25). A comprehensive systematic review and meta-analysis (26) investigated the relationship between stress and nonspecific neck and arm pain and determined a strong relationship between these parameters. However, the same study (26) also stated that stress should not be considered a risk factor for neck and arm pain. Therefore, we can conclude that students' neck and upper extremity pain are not directly caused by stress, but rather that the stress-pain cycle can develop reciprocally.

In our study, weak but significant correlations have been found between shoulder, back, low back, knee pain and stress. This suggests that stress has not only local but also multisystemic effects (27). The increase in cortisol and the inflammatory response caused by stress can increase pain sensitivity in the musculoskeletal system (28). Therefore, it has been reported that psychiatric and psychosocial factors, especially stress, must be evaluated for musculoskeletal health, and that appropriate treatment approaches should be implemented (29). In this context, mindfulness-based stress reduction methods (30), cognitive behavioral therapy (31) and relaxation techniques (32) may be effective.

The results of this study are consistent with those of Morais et al. (2021) (27). Similar to our study, they also reported that stress was associated with MSDs in healthcare students and neck pain, in particular, increased significantly (33). Similarly, Abdulaziz et al. (33) emphasized that psychosocial stress, in addition to ergonomic factors, triggered pain in students (34). However, unlike some studies, this study found no significant difference in stress levels between departments ($p=0.590$). This could be explained by the fact that all health sciences students are exposed to similar academic and clinical stress factors (35).

This study has several limitations. First, the small sample size of our study ($n=90$) limits the interpretation of our findings and results. Future studies should examine the relationship between musculoskeletal problems and stress with larger samples. Second, the cross-sectional design used in our study limits the ability to establish a causal relationship. If we had accessed students from different schools, we could have examined the source of the relationship between musculoskeletal problems and stress in more detail. Finally, the self-report measures used in our study are susceptible to recall bias. Therefore, caution should be exercised when interpreting data obtained with these measures.

Turk J Clin Res. 2025;1(2):101-107
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CONCLUSION

In conclusion, this study demonstrated that stress is significantly associated with musculoskeletal pain in health sciences students. Stress-reducing interventions (mindfulness, relaxation exercises) may be recommended, particularly for the management of neck and back pain. Additionally, ergonomics training and physical activity programs may be effective in reducing students' pain complaints. Both physical activity and ergonomics sessions can be implemented in groups through collaboration with university health departments. Sessions of at least twenty minutes, two days a week, may be beneficial to students.

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Ethical Approval: Approval was obtained from the Kütahya Health Sciences University Non-Interventional Research Ethics Committee (Decision No: 2025/06-28, dated 06.05.2025).

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Turk J Clin Res. 2025;1(2):101-107
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