

# Investigation of factors affecting musculoskeletal pain and quality of life in university students

Musculoskeletal pain in students

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## Abstract

**Aim:** In this study, we aimed to examine the factors affecting musculoskeletal pain and quality of life in university students experiencing musculoskeletal pain. **Material and Methods:** Two hundred-eighteen (F:120; M:98) ( $X=21.22\pm 1.9$ ) university students studying at Pamukkale University School of Physical Therapy and Rehabilitation were included in the study. Due to the Covid-19 pandemic, the study was conducted over the phone and online. The correlation between the Cornell Musculoskeletal Discomfort Scale and the Nottingham Health Profile with gender, age, BMI, smoking habit, exercise habit, and time spent in front of a desk-computer-TV was examined.

**Results:** Age parameter was correlated with back musculoskeletal pain in the trunk region ( $p<0.05$ ). Body Mass Index parameter was correlated with back, lower back and shoulder musculoskeletal pain ( $p<0.05$ ). Smoking habit was found to be correlated with musculoskeletal pain in the right hand and wrist ( $p<0.05$ ). Exercise habits were found to be correlated with musculoskeletal pain in all regions except both hands and wrists and both lower legs ( $p<0.05$ ). There was a correlation between time spent sitting at the desk-computer-TV and musculoskeletal system pains in the neck, back, low back, shoulder and hip ( $p<0.05$ ). Quality of life was moderately correlated with smoking habits ( $p<0.05$ ) and was positively correlated with exercise habits ( $p<0.05$ ). Significant correlations were found between the duration of sitting at the desk-computer-TV and the quality of life parameters ( $p<0.05$ ).

**Discussion:** University students suffer from musculoskeletal pain due to a relatively intense training program based on practice and some harmful habits, and their quality of life is negatively affected by this situation. Students should take precautions to protect their musculoskeletal systems and gain regular exercise habits.

## Keywords

College students; Musculoskeletal pain; Quality of life

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## Introduction

Musculoskeletal system disorders are defined as disturbances or diseases in the musculoskeletal system and arising from work, according to the International Occupational Health and Safety Commission. The term “arising from work” is used by the World Health Organization to describe the scientific cause of a multi-factor disease that starts with the effect of two factors such as job performance and work environment [1]. Musculoskeletal disorders in working and education life occur due to repetitive physical movements such as bending, stretching, grasping, holding, turning, compression, and stretching that cause damage to tendons, muscles, nerves and other soft tissues [2]. These common movements in the usual activities of daily life are actually not harmful. What makes these movements harmful is the continuous repetition, speed, and lack of time between two movements for recovery [3].

Health-related quality of life refers to the ability of health to fulfill the functions of individuals and the physical, mental and social space that individuals perceive in their lives. Health-related quality of life criteria are widely used in health programs, evaluation of the effectiveness of treatment and economic evaluation studies [4]. Today, it is aimed not only to eliminate diseases but also to increase the quality of life of people. Therefore, an increasing efforts are being made to measure well-being and quality of life [5].

Musculoskeletal pain that occurs in young adults may be due to any organic pathology of neoplastic, inflammatory or infectious origin, and the majority of cases develop due to factors such as posture and working conditions. In various studies on the subject, in the formation of musculoskeletal system pain in the early period, it has been determined that gender, class of study, computer use, the burden of students, sitting time, time after school, academic stress and exercise habits are effective [6].

The aim of this study is to examine the factors affecting musculoskeletal pain and quality of life in university students experiencing musculoskeletal pain.

## Material and Methods

The study was conducted in September-October 2020. Two hundred-eighteen (F:120; M:98) ( $X \pm SD = 21.22 \pm 1.9$ ) university students studying at Pamukkale University School of Physical Therapy and Rehabilitation were included in the study. The inclusion criteria were being between the ages of 18-30 and having idiopathic musculoskeletal pain in at least one part of the body, while the exclusion criteria were to have any diagnosis that would cause pain in the musculoskeletal system and to have undergone a surgical operation within the last 6 months. Participation in the study was voluntary. The questionnaires used were filled in by phone and various online methods due to the Covid-19 pandemic.

It was decided by Pamukkale University Non-Interventional Research Medical Ethics Committee with the number of 60116787-020/37898 that the study was ethically appropriate. Informed approval was obtained from every participant in the study.

### Demographic Data Form

The data of the participants such as gender, age, height, weight, exercise habits, daily sitting time at a desk, daily computer use,

daily television watching time and smoking habit were recorded in demographic data forms. For the exercise habit, it is required to exercise regularly for at least 3 days a week in the last 6 months and to have been smoking for at least the last 6 months for the smoking habit.

### Cornell Musculoskeletal Discomfort Questionnaire

The Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) takes into account the severity and frequency of pain in the body, taking into account body postures, gender and the way the work is done. Turkish adaptation study has been done. The questionnaire has separate evaluations for female/male and sitting time/standing jobs. In the questionnaire, 18 different body regions are presented in the form of options to what extent and how often they cause discomfort in the last week, and people are asked to choose the one that suits them. From the 3 groups of questions presented in the questionnaire, the answers given for each of the 18 body regions and the risk score for each region are calculated. Values corresponding to the answers given in the CMDQ risk score calculation are multiplied with each other. The Turkish validity and reliability study was performed by Erdinç et al. [7].

### Nottingham Health Profile

The Nottingham Health Profile (NHP) is a general health questionnaire developed to measure the physical, emotional and social effects of diseases on a person. It contains a total of 38 questions in six parts: pain, physical activity, energy, sleep, social isolation and emotional reaction. Questions are answered as yes or no. Each section is scored between 0-100. Zero (0) indicates the best health status, 100 the worst health status [8]. The adaptation of NSP to Turkish and its psychometric properties were made by Kucukdeveci et al. [9].

### Statistical Analysis

In the power analysis made in line with the information obtained from the literature, assuming that the effect size of the correlation between the variables to be examined could be moderate ( $r=0.4$ ), it was calculated that 90% power could be obtained at a 95% confidence level when at least 184 people were included in the study [10]. Considering the possible data loss, it was planned to include at least 200 participants in the beginning of the study.

The data were analyzed with SPSS 25 (IBM SPSS Statistics 25 software (Armonk, NY: IBM Corp.)) package program. Continuous variables are given as mean  $\pm$  standard deviation. Since the correlations between continuous variables are suitable for normal distribution, they were analyzed using Pearson correlation analysis.

## Results

The gender parameter was not found to correlate with musculoskeletal pain in any part of the body (Tables 1 and 2) ( $p>0.05$ ).

Age parameter was correlated with back musculoskeletal pain in the trunk region ( $p<0.05$ ), but not with neck and low back pain (Table 1) ( $p>0.05$ ). Age parameter was not correlated with musculoskeletal pain in the extremities (Tables 2 and 3) ( $p>0.05$ ).

While the BMI parameter was correlated with musculoskeletal pain in the back, lower back and shoulder ( $p<0.05$ ), it was not

**Table 1.** The correlation between the factors examined and musculoskeletal pain in the trunk

	r/p	Neck	Back	Low Back
Gender	r	0,016	-0,038	-0,016
	p	0,810	0,577	0,811
Age	r	0,127	0,179*	0,118
	p	0,060	0,008	0,081
BMI	r	-0,107	0,544*	0,505*
	p	0,115	0,034	0,042
Smoking Habit	r	0,036	0,011	-0,078
	p	0,599	0,874	0,249
Exercise Habit	r	-0,570*	-0,639*	-0,523*
	p	0,002	0,040	0,031
Time spent sitting at a desk	r	0,815*	0,642*	0,535*
	p	0,030	0,039	0,007
Time spent sitting at the computer	r	0,507*	0,540*	0,632*
	p	0,024	0,040	0,042
Time spent sitting in front of the TV	r	0,542*	0,626*	0,536*
	p	0,034	0,008	0,008

r: Correlation Coefficient p: Significance Level Pearson Correlation Analysis \*: p<0,05

correlated with pain in other regions (Tables 1 and 2) (p>0.05). Smoking habit was found to be correlated with musculoskeletal pain in the right hand and wrist (Table 2) (p<0.05). Apart from these, it was not correlated with pain in any other region (Tables 1 and 2) (p>0.05).

Exercise habits were found to be correlated with musculoskeletal pain in all regions except both hands and wrists and both lower legs (Tables 1 and 2) (p<0.05).

While there was a correlation between time of sitting at the desk-computer-TV and neck, back, low back, shoulder and hip musculoskeletal system pains (p<0.05), no correlation with pain in other regions was found (Tables 1 and 2) (p>0.05).

According to Table 3, while quality of life was moderately correlated with smoking habits (p<0.05), it was positively correlated with exercise habits (p<0.05). Significant correlations were found between the duration of sitting at the desk-computer-TV and the quality of life parameters (p<0.05).

**Table 2.** Correlation between the factors investigated and musculoskeletal pain in the extremities

		Gender	Age	BMI	Smoking Habit	Exercise Habit	Time spent sitting at a desk	Time spent sitting at the computer	Time spent sitting in front of the TV
R Shoulder	r	-0,194	-0,007	-0,152*	0,024	-0,606*	0,569*	0,486*	0,482*
	p	0,104	0,923	0,025	0,723	0,019	0,309	0,206	0,226
L Shoulder	r	-0,169	0,008	-0,144*	0,021	-0,526*	0,571*	0,472*	0,604*
	p	0,113	0,903	0,034	0,763	0,044	0,024	0,022	0,027
R Arm	r	-0,098	-0,087	0,003	-0,047	-0,655*	0,066	0,055	0,030
	p	0,149	0,198	0,968	0,492	0,022	0,330	0,418	0,655
L Arm	r	-0,074	-0,043	0,023	-0,031	-0,648*	0,037	0,054	0,025
	p	0,274	0,524	0,737	0,653	0,028	0,582	0,429	0,711
R Forearm	r	-0,007	-0,063	-0,010	-0,087	-0,630*	0,084	0,068	0,036
	p	0,916	0,354	0,878	0,203	0,045	0,217	0,321	0,597
L Forearm	r	0,070	0,162	0,080	0,031	-0,529*	0,076	0,032	0,025
	p	0,301	0,117	0,241	0,646	0,035	0,263	0,640	0,712
R Wrist	r	0,075	-0,018	0,193	0,614*	-0,041	0,043	0,047	0,048
	p	0,270	0,795	0,054	0,034	0,548	0,530	0,488	0,484
L Wrist	r	0,040	0,042	-0,052	-0,010	-0,039	0,005	0,069	0,017
	p	0,559	0,539	0,447	0,106	0,563	0,900	0,309	0,804
R Hand	r	-0,011	-0,063	-0,021	0,629*	-0,050	0,109	0,066	0,036
	p	0,875	0,356	0,753	0,047	0,461	0,107	0,330	0,601
L Hand	r	0,055	-0,001	-0,099	0,081	-0,013	0,064	0,045	0,006
	p	0,423	0,984	0,144	0,107	0,854	0,344	0,513	0,924
Hips	r	-0,082	0,123	-0,098	-0,083	-0,498*	0,584*	0,567*	0,556*
	p	0,230	0,070	0,149	0,223	0,049	0,019	0,026	0,013
R Knee	r	-0,110	0,032	-0,054	-0,164	-0,651*	0,023	0,047	0,015
	p	0,106	0,637	0,428	0,116	0,045	0,733	0,487	0,830
L Knee	r	-0,137	0,015	-0,022	-0,131	-0,551*	0,002	0,043	0,014
	p	0,444	0,822	0,746	0,054	0,045	0,980	0,525	0,834
R Thigh	r	-0,144	0,023	-0,037	-0,068	-0,547*	0,103	0,006	0,043
	p	0,333	0,740	0,590	0,316	0,048	0,130	0,930	0,524
L Thigh	r	-0,081	0,045	-0,050	-0,082	-0,502*	0,071	0,004	0,083
	p	0,236	0,512	0,466	0,230	0,048	0,295	0,948	0,225
R Lower Leg	r	-0,044	-0,045	0,051	-0,099	-0,057	0,008	0,061	0,047
	p	0,515	0,513	0,455	0,143	0,401	0,907	0,373	0,493
L Lower Leg	r	0,015	-0,045	0,050	-0,055	-0,016	0,054	0,020	0,011
	p	0,821	0,513	0,467	0,417	0,818	0,429	0,772	0,873

r: Correlation Coefficient p: Significance Level Pearson Correlation Analysis \*: p<0,05 L: Left R: Right

**Table 3.** Correlation between the factors examined and quality of life

	r/p	Energy Level	Pain	Emotional Reaction	Social Isolation	Sleeping	Physical Activity	Total
Gender	r	-0,192	-0,057	0,029	-0,112	0,045	-0,097	-0,081
	p	0,104	0,405	0,667	0,098	0,505	0,155	0,236
Age	r	0,056	0,069	0,080	0,032	0,136	0,001	0,088
	p	0,411	0,313	0,241	0,635	0,055	0,990	0,196
BMI	r	-0,138	-0,023	-0,052	-0,060	-0,028	-0,135	-0,092
	p	0,041	0,737	0,446	0,380	0,682	0,046	0,178
Smoking Habit	r	0,533*	0,752*	0,062	0,531*	0,504*	0,640*	0,529*
	p	0,049	0,025	0,501	0,045	0,001	0,039	0,001
Exercise Habit	r	-0,574*	-0,628*	-0,518*	-0,468*	-0,534*	-0,780*	-0,612*
	p	0,026	0,043	0,081	0,019	0,014	0,039	0,042
Time spent sitting at a desk	r	0,053	0,722*	0,071	0,595*	0,518*	0,517*	0,655*
	p	0,434	0,043	0,296	0,033	0,040	0,006	0,038
Time spent sitting at the computer	r	0,402	0,615*	0,025	0,637*	0,555*	0,525*	0,502*
	p	0,077	0,029	0,719	0,046	0,020	0,018	0,048
Time spent sitting in front of the TV	r	0,087	0,539*	0,009	0,037	0,025	0,554*	0,538*
	p	0,203	0,045	0,334	0,591	0,711	0,036	0,041

r: Correlation Coefficient p: Significance Level Pearson Correlation Analysis \*: p<0,05

### Discussion

The results of this study showed that physiotherapy and rehabilitation students suffer from musculoskeletal pain in various parts of their bodies due to reasons such as prolonged sitting in front of a table-computer-television, smoking habit, high BMI and insufficient physical activity. Gender and age factors do not have a significant effect on this situation.

It has been shown that musculoskeletal pain, especially low back pain, is a reality for many physiotherapy and rehabilitation students [11]. Moreover, these students are from the young population, as in our study.

In the current literature, physiotherapy and rehabilitation students also suffer from musculoskeletal pain during education, as in various health departments such as medicine, nursing, dentistry, occupational therapist and health technician. Physiotherapy and rehabilitation students are at higher risk compared to other departments [12].

In the current literature, there are conflicting findings that the musculoskeletal pain experienced by students of various health sciences varies by gender. Some studies state that male gender is a risk factor, while others state that female [13-15]. In our study, it was found that the musculoskeletal pain in the university students did not depend on gender.

In our study, the age criterion did not make a significant difference. The reason for this situation is possibly the young population and the narrow age range. The literature has also reported that the risk of musculoskeletal pain increases as it progresses, especially by age 65 [16].

According to the results of our study, as BMI increases, the level of musculoskeletal pain felt by the students in the shoulder, low back and back region increases significantly. As the BMI increases, the loads on the vertebral column increase and consequently, despite the young age, pain is felt in the back and low back regions. In the current literature, there are studies supporting these findings [17, 18]. On the other hand, according to the results of our study, BMI does not have a significant effect on musculoskeletal pain in other body parts.

A possible reason of the significant correlation between smoking habits and musculoskeletal pain felt in the right hand and wrist region was the badly affected circulatory system in the upper extremity [19].

There are conflicting findings in the literature regarding the correlation between smoking and musculoskeletal pain. There are studies [20] stating that smoking affects pain in the musculoskeletal system in university students, as well as studies stating that it has no effect [21].

Individuals with exercise habits have lower musculoskeletal pain in almost all neck, back, low back, upper extremity and lower extremity regions. In light of the findings from this study, we can make the comment that correct and regular exercise prevents and/or relieves musculoskeletal pain in university students aged 18-30. From another perspective, we could say that the reduced physical activity will cause musculoskeletal disorders in university students [12]. Contrary to our findings, in a study conducted with medical faculty students, it was observed that students with regular exercise habits experienced 4 times more musculoskeletal pain in the back area compared to students who did not [13]. We thought that the reason for this situation was that the medical faculty students in the study in question did not perform the exercises correctly, and the physiotherapy and rehabilitation department students were trained about the correct exercise from the first period of their education, so they did the exercises correctly.

According to the results of this study, time spent sitting at a desk, computer or television has been associated with musculoskeletal pain in the neck, back, low back, shoulder and hip regions. Sitting at a desk for a long time to study, sitting at the computer for activities such as study or games, and sitting at the computer watching television cause long-term immobilization in students, so all muscles, especially pivot areas such as the neck, back, low back and shoulder-hip caused pain in the skeletal system.

In the current literature, there are studies showing that sitting at a desk or computer for a long time negatively affects the

entire musculoskeletal system, in support of these findings [13, 21]. In addition, there are studies showing that sitting at the computer for a long time causes upper arm pain, especially in university students [13], as well as studies showing that it causes more shoulder and neck pain [21].

According to the results of our study, factors such as, gender, age and BMI were not significantly correlated with the quality of life of the studied student population. The facts that the students are in a social environment in the university and their age is not yet advanced are considered as the reasons for this situation. On the other hand, in the current literature, it has been shown that female gender [22] and older age [23] have a negative effect on the quality of life of university students.

Smoking habit negatively affects the quality of life based on energy level, pain, social isolation, sleep and physical activity and consequently decreases the quality of life. There are studies supporting these findings in the current literature [24, 25].

Sitting time for long periods of time at a desk, computer and TV creates social isolation, disrupts sleep patterns, reduces physical activities and causes musculoskeletal pain. As a result, even if it is a young and social population, the quality of life of university students aged 18-30. Supporting these findings, there are studies showing that sedentary life and long-term immobilization negatively affect the quality of life of university students [22, 23].

The strength of our study is that, contrary to the existing studies in the literature, it is not aimed to investigate the presence of musculoskeletal pain in university students in a certain department, but to investigate the causes of these pains and the quality of life of students who already have musculoskeletal pain. In addition, it emphasizes the positive effects of regular exercise habits on the musculoskeletal system and quality of life, and the negative effects of smoking habits and immobilization time, which increases with technology in today's youth. The limitation of our study is that participants from only one university and one department were included in the study. University students suffer from musculoskeletal pain due to intense education program and some harmful habits, and their quality of life is negatively affected by this situation. Students should take precautions to protect their musculoskeletal systems and gain regular exercise habits.

#### Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

#### Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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#### Conflict of interest

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