Risk factors for reduced core endurance, fatigue and physical inactivity in medical students

Tıp fakültesi öğrencilerinde azalmış kor enduransı, yorgunluk ve fiziksel inaktivite için risk faktörleri

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Abstract

Aim: In medical faculty students' investigation of risk factors for physical inactivity and fatigue and basic resilience is important to identify individuals at risk. The primary aim of this study was to determine the factors affecting core endurance, fatigue, and physical inactivity in medical faculty students. The secondary aim is to evaluate the relationship between core endurance and fatigue, physical activity, and low back pain. Additionally, to investigate the relationship between fatigue and physical activity level.

Methods: This quantitative cross-sectional study was conducted with 201 healthy volunteer medical faculty students. Demographic data and the history of low back pain were recorded. The trunk flexors endurance test (FLET), Modified Biering-Sorensen test (MBST), and lateral bridge test (LBT) were used to measure trunk muscle core endurance. The physical activity levels of the participants were measured using the "International Physical Activity Scale" (IPAQ). The fatigue Severity Scale was used for the evaluation of fatigue.

Results: FLET (p=0.021), MBST (p=0.004), LBT-Right (<0.001), LBT-Left (<0.001) tests were significantly higher in the group with FSS <2.3. A significant correlation was found between female gender and FLET (p<0.001), MBST (p<0.001), LBT-Right (p<0.001), LBT-Left (p<0.001). Gender (p=0.049), MBST (p=0.003) and MET 3 (p=0.025) were determined as factors affecting fatigue in the regression model. Female gender (OR= 0.376; p= 0.049) and MBST (OR= 0.986; p= 0.003) was determined as a risk factor for fatigue.

Conclusion: Female gender, decreased core endurance, and physical inactivity are protective factors affecting fatigue in medical school students. Age, gender, body mass index, smoking, alcohol, and low back pain history were not found to be risk factors for physical inactivity. Improving core endurance is protective for physical inactivity.

Keywords: Fatigue; low back pain; medical students; physical endurance

Öz

Amaç: Tıp fakültesi öğrencilerinde fiziksel hareketsizlik, yorgunluk ve temel dayanıklılık için risk faktörlerinin araştırılması, risk altındaki bireyleri belirlemek için önemlidir. Araştırmanın temel amacı, tıp fakültesi öğrencilerinde yorgunluğu, fiziksel aktivite düzeyini ve kor enduransını etkileyen faktörleri belirlemektir. İkincil amaç ise, gövde dayanıklılığı ile yorgunluk, fiziksel aktivite ve bel ağrısı arasındaki ilişkiyi değerlendirmektir. Ayrıca yorgunluk ile fiziksel aktivite düzeyi arasındaki ilişkinin de araştırılmasıdır.

Yöntemler: Bu nicel kesitsel çalışma, 201 sağlıklı gönüllü tıp fakültesi öğrencisi ile yapılmıştır. Demografik veriler ve bel ağrısı öyküsü kaydedildi. Gövde kas çekirdek dayanıklılığını ölçmek için gövde fleksör dayanıklılık testi (FLET), Modifiye Biering-Sorensen testi (MBST) ve lateral köprü testi (LBT) kullanıldı. Katılımcıların fiziksel aktivite düzeyleri "Uluslararası Fiziksel Aktivite Ölçeği" (IPAQ) kullanılarak ölçüldü. Katılımcıların yorgunluk düzeyi Yorgunluk Şiddet Ölçeği (FSS) ile değerlendirildi.

Bulgular: Katılımcıların gövde endurans ölçümleri yorgunluk düzeyine göre değerlendirildiğinde; gövde fleksör dayanıklılık testi (FLET) (p=0,021), Modifiye Biering-Sorensen testi (MBST) (p=0,004), lateral köprü testi-Sağ (LBT-Sağ) (<0,001), lateral köprü testi-Sol (LBT-Sol) (<0,001) testleri Yorgunluk Şiddet Ölçeği <2,3 olan grupta anlamlı olarak daha yüksekti. Kadın cinsiyet ile FLET (p<0,001), MBST (p<0,001), LBT-Sağ (p<0,001), LBT-Sol (p<0,001) arasında anlamlı ilişki bulundu. Regresyon modelinde yorgunluğu etkileyen faktörler olarak cinsiyet (p=0.049), MBST (p=0.003) ve MET 3 (p=0.025) belirlendi. Kadın cinsiyet (OR= 0.376; p= 0.049) ve MBST (OR= 0.986; p= 0.003) yorgunluk için risk faktörü olarak belirlendi.

Sonuç: Kadın cinsiyet, kor enduransının azalması ve fiziksel inaktivite, tıp fakültesi öğrencilerinde yorgunluğu etkileyen koruyucu faktörlerdir. Yaş, cinsiyet, beden kitle indeksi, sigara, alkol ve bel ağrısı öyküsü fiziksel inaktivite için risk faktörü olarak saptanmamıştır. Kor enduransının iyileştirilmesi fiziksel inaktivite için koruyucudur.

Anahtar Sözcükler: Bel ağrısı, fiziksel dayanıklılık; tıp öğrencileri; yorgunluk.

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INTRODUCTION

The core region is the area consisting of the deep abdominal muscles, pelvic floor muscles, gluteal muscles, and the diaphragm, which are associated with the thoracolumbar fascia and spine. Core muscles are responsible for transferring axial load to distal joints and keeping stability during movement (1). It was reported in a recent study with university students that the relationship between core muscle strength and physical activity level is unclear and further studies are needed (2). Physical inactivity is a major problem for university students. Data in the literature that university students are more inactive than other age groups (3). It has been reported that academic reasons such as increased computer use, long study times, and long hours spent at the desk in university students, as well as individual factors such as separation from the family and reduced control, contribute to sedentary behavior and increased physical inactivity (4). That is an increase in physical inactivity and fatigue levels due to the COVID-19 pandemic and related lockdown periods (5).

It has been reported in the literature that fatigue may occur secondary to any disease, or it may result from the prolongation of fatigue in addition to psychosocial factors, or it may also be caused by psychological factors such as anxiety and depression. Factors such as emotional intelligence, social support, and sleep quality have been reported to be associated with fatigue (6). There are studies on the psychosocial grounds of fatigue in the literature (6).

The university education period is the period when life-long habits begin to form (7). Interventions for students during this period are important in terms of preventive medicine. It has been reported that there is evidence that physical inactivity is a major public health problem (8). It is significant to identify risk factors for physical inactivity and fatigue, and decreased core endurance in medical school students. Thus, risky individuals can be identified and appropriate corrective interventions can be developed. In this study, from a different perspective rather than psychosocial factors affecting fatigue; we aimed to investigate its relationship with modifiable factors such as physical inactivity and endurance.

The hypothesis of our study is that physical inactivity is associated with decreased trunk muscle endurance in medical faculty students. Additionally, physical inactivity and decreased endurance are risk factors for fatigue.

The primary aim of the study was to determine the factors affecting core endurance, fatigue, and physical inactivity in medical faculty students. The secondary aim is to evaluate the correlation between core endurance and fatigue, physical activity, and low back pain. It is also to investigate the correlation between fatigue and physical activity level.

MATERIAL AND METHODS

This cross-sectional study was conducted with 201 healthy volunteer medical faculty students aged 18-24. This study was carried out at the Faculty of Medicine of our university between January 1, 2022, and May 5, 2022. Participants with a history of musculoskeletal surgical operation in the last 1 year and with a known diagnosis of specific low back pain (spondylolisthesis, lumbar disc herniation), participants with a diagnosis of knee ligament and connective tissue, meniscus damage, participants with a diagnosis of scoliosis, participants with malignancy and inflammatory disease and psychiatric disease were not included this study. Diagnoses in the exclusion criteria are based on the history taken from the participants. No diagnostic imaging method or diagnostic test was applied to the participants. Healthy students who did not meet the exclusion criteria and were accepted to participate in the study were included in the study. Demographic data of the participants, such as age, smoking, drinking, weight, and height were recorded.

The trunk flexors endurance test (FLET), Modified Biering-Sorensen (MBST) test and lateral bridge test (LBT) were used to evaluate trunk muscle endurance. Warm-up exercises were not applied before these tests in order not to cause muscle fatigue and affect the result of the study. All the participants performed the tests in the same order and a 3-minute rest period was applied between all tests. The participants performed respectively firstly the FLET, then the MBST, and the right and left lateral bridge tests.

Trunk Flexors Endurance Test: Participants were positioned with the trunk flexed to 60°, knees and hips to 90° flexion position. The examiners prevented

Table 1. Group comparison results for fatigue level

	Fatigue level < 2.3	Fatigue level ≥ 2.3	p
Age	20.81 ± 1.939	21.03 ± 2.088	0.458
Female, n (%)	8 (30.8)	107 (61.8)	**0.005**
Male, n (%)	18 (69.2)	66 (38.2)	
LBP, n (%)	9 (34.6)	17 (65.4)	0.334
Smoking, n (%)	10 (38.5)	49 (28.3)	0.357
Alcohol, n (%)	8 (30.8)	39 (22.5)	0.457
FLET, Mean±SD	91.58 ± 51.555	66.33 ± 51.36	**0.021**
MBST, Mean±SD	96.31 ± 61.363	57.56 ± 35.661	**0.004**
LBT-Right, Mean±SD	78.42 ± 39.478	46.55 ± 33.777	**<0.001**
LBT-Left, Mean±SD	75.19 ± 38.024	44.99 ± 31.463	**<0.001**
MET, n (%)			0.029
1	11 (42.3)	92 (53.2)	
2	3 (11.5)	42 (24.3)	
3	12 (46.2)	39 (22.5)	

BMI: Body Mass Index, FLET: Trunk flexor endurance test, LBP: Low Back Pain, LBT: Lateral bridge test, MBST: Modified "Biering-Sorensen" test, MET: Metabolic Equivalent Task (MET)-minute/week, n: Number, SD: Standard Deviation.

the foot from getting off the ground by supporting it from the tip of the foot. The test was terminated when 60° of trunk flexion was impaired and the time it held this position was recorded in seconds (9) **(Figure 1).**

Modified "Biering-Sorensen" Test: The endurance of trunk extensors was measured with this test. Participants were positioned in the prone position with the pelvis, hips and knees on the bed. Care was taken to ensure that the iliac crest came to the upper edge of the table. The pelvis, knees and ankles were fixed on the table by the examiner. Participants were asked to extend their upper body straight from the edge of the table. The time that the participant could maintain the horizontal position was recorded with a stopwatch in seconds (10) **(Figure 2)**.

Lateral Bridge Test: During the test, participants were lying on their sides, raising their bodies on their forearms and toes and maintaining this position. The time he protected the current position was recorded in seconds. The test was applied in both directions, right and left (9) **(Figure 3)**.

The physical activity levels of the participants were measured using the "International Physical Activity Scale" (IPAQ). The IPAQ allows participants to be divided into 3 groups; low, moderate, and high physical activity levels. In this study, MET (metabolic equivalent task (MET)-minute/week) values were calculated according to this scale, which has Turkish validity and reliability. Participants were divided into 3 groups according to their physical activity level. Participants with a physical activity (PA) of 600 MET-min/week or less were considered MET 1 (low). Participants with physical activity (PA) between 601 and 3000 MET-min/week were considered MET 2 (moderate). Participants with a PA amount of more than 3000 MET-min/week were considered MET 3 (intensive) (11).

"Fatigue Severity Scale" (FSS) was used to measure the fatigue level of the participants. This scale includes a 7-point Likert scale. High scores are associated with increased fatigue. Turkish validity and reliability were determined (14). The mean (SD) FSS score in healthy adults was determined as 2.3 (0.7). (15) For this reason, we classified the participants with FSS scores <2.3 and ≥ 2.3 while performing the analyzes in our study.

Participants were questioned whether they had experienced low back pain before. If participants had low back pain before, they were considered to "Low Back Pain-Yes". If participants had not had low back pain before, they were accepted as " Low Back Pain-No".

Table 2. Group comparison results for endurance levels

	Trunk flexor endurance test	**p**
Female	58.82 ± 50.399	
Male	85.1 ± 50.486	**<0.001**
Fatigue < 2.3	91,58 ± 51,555	
Fatigue ≥ 2.3	66,33 ± 51,36	0.021
LBP Yes	60.86 ± 39.258	
LBP No	63.3 ± 42.682	0.897
MET 1	55.83 ± 39.912	
MET 2	66.11 ± 46.316	
MET 3	101.49 ± 64.106	**<0.001**
	Modified "biering-sorensen" test	**p**
Female	51.85 ± 35.175	
Male	77.32 ± 45.534	**<0.001**
Fatigue < 2.3	96,31 ± 61,363	
Fatigue ≥ 2.3	57,56 ± 35,661	**0.004**
LBP Yes	60.86 ± 39.258	
LBP No	63.3 ± 42.682	0.897
MET 1	52.24 ± 35.488	
MET 2	65.13 ± 42.617	
MET 3	81.53 ± 46.281	**<0.001**
	Lateral bridge test- right	**p**
Female	39.15 ± 24.2	
Male	66.38 ± 42.977	**<0.001**
Fatigue < 2.3	78,42 ± 39,478	
Fatigue ≥ 2.3	46,55 ± 33,777	**<0.001**
LBP Yes	49.1 ± 30.604	
LBP No	51.28 ± 37.77	0.979
MET 1	43.53 ± 32.411	
MET 2	48.37 ± 29.733	
MET 3	67.35 ± 42.787	**0.001**
	Lateral bridge test- left	**p**
Female	37.44 ± 22.46	
Male	64.44 ± 39.931	**<0.001**
Fatigue < 2.3	75,19 ± 38,024	
Fatigue ≥ 2.3	44,99 ± 31,463	**<0.001**
LBP Yes	48.24 ± 28.097	
LBP No	49.15 ± 35.598	0.612
MET 1	40.76 ± 30.741	
MET 2	46.37 ± 28.045	
MET 3	67.69 ± 37.455	**<0.001**

BMI: Body Mass Index, FLET: Trunk flexor endurance test, LBP: Low Back Pain, LBT: Lateral bridge test, MBST: Modified "Biering-Sorensen" test, MET: Metabolic Equivalent Task (MET)-minute/week, n: Number, SD: Standard Deviation.

Table 3. Group comparison results for MET levels

	MET1 (n=103)	MET 2 (n=47)	MET 3 (n=51)	p
Age	21.32 ± 1.981	20.94 ± 2.1	20.41 ± 2.09	**0.014**
Female	68 (66)	28 (59.6)	20 (39.2)	**0.006**
Male	35 (34)	19 (40.4)	31 (60.8)	
BMI	22.336 ± 2.842	25.066 ± 17.813	23.019± .842	0.329
Smoker	24 (23.3)	17 (36.2)	18 (35.3)	0.154
Alcohol	25 (24.3)	11 (23.4)	11 (21.6)	0.933
LBP	33 (32)	8 (17)	10(19.6)	0.08

* BMI: Body Mass Index, FLET: Trunk flexor endurance test, LBP: Low Back Pain, LBT: Lateral bridge test, MBST: Modified "Biering-Sorensen" test, MET: Metabolic Equivalent Task (MET)-minute/week, n: Number, SD: Standard Deviation.

Table 4. Binary logistics regression analysis results for fatigue level

Variables	OR	p-value	95% CI for OR	
			Lower	Upper
Gender (female)	**0.376**	**0.049**	0.142	0.994
MET=1 (Ref. Category)	-	-	-	-
MET=2	0.987	0.987	0.208	4.681
MET=3	**0.114**	**0.025**	0.017	0.763
MBST	**0.986**	**0.003**	0.976	0.995

* MBST: Modified "Biering-Sorensen" test, MET: Metabolic Equivalent Task (MET)-minute/week, OR :Odds Ratio.

Table 5. Multinomial logistic regression analysis results for factors affecting MET**

		OR	p value	95% CI for OR	
				Lower	Upper
MET 1	Age	1.237	0.052	0.998	1.534
	Gender (female)	1.336	0.533	0.537	3.324
	BMI	0.999	0.981	0.891	1.119
	Smoker	0.422	0.091	0.155	1.146
	Alcohol	1.877	0.232	0.668	5.278
	LBP	1.566	0.388	0.566	4.336
	FLET	**0.987**	**0.022**	0.977	0.998
	MBST	0.996	0.629	0.982	1.011
	LBT (right)	**1.053**	0.008	1.014	1.094
	LBT (left)	**0.943**	**0.004**	0.906	0.982
MET 2	Age	1.137	0.291	0.896	1.442
	Gender (female)	1.621	0.347	0.593	4.428
	BMI	1.028	0.617	0.922	1.147
	Smoker	1.302	0.626	0.45	3.768
	Alcohol	1.145	0.508	0.205	2.19
	LBP	0.671	0.508	0.205	2.19
	FLET	**0.986**	0.024	0.974	0.998
	MBST	1.009	0.209	0.995	1.023
	LBT (right)	1.033	0.111	0.993	1.074
	LBT (left)	**0.958**	0.044	0.918	0.999

*BMI: Body Mass Index, LBP: Low Back Pain; FLET: Trunk flexor endurance test, MBST: Modified "Biering-Sorensen" test, LBT: Lateral bridge test,MET: Metabolic Equivalent Task (MET)-minute/week.; OR: Odds Ratio ** The reference category is: MET=3.00.

Ethical Approval

Approval for this study was approved by the Clinical Research Ethics Committee of Kırsehir Ahi Evran University Faculty of Medicine (date: 22.02.2022, decision no: 2022-04/34). Also registered on clinicaltrials.gov (Clinical Trials ID: NCT05366959). This study was conducted in accordance with the Declaration of Helsinki and all participants signed a voluntary consent form before starting the study. Additionally, no financial support was received for this study.

Simple Size Calculation

As there was no similar study in the literature, at first pilot study was employed for the research. The pilot study was initiated to include at least 20 people in each MET group. Post-hoc power analysis was performed in accordance with the primary end-point of the study, results of FLET, MBST, LBT right and left comparisons across MET groups were utilized to obtain post-hoc Powers. G Power program (v.3.1.9.6) was used for the analysis. Results revealed that 0.954 to 0.999 post-power were achieved to capture 0.282 to 0.39 partial Eta-squared (η^2) effect sizes.

Statistical Analysis

Mean±Standard deviation (SD) values were reported for numerical variables; while frequency (n) and percentage (%) were given for categorical variables. Chi-Square Test was used for categorical variables. Normality and variance homogeneity assumptions were assessed via Shapiro-Wilk Test and Levene Test, respectively. Independent Samples t-test, Mann-Whitney U Test, One-Way Analysis of Variance (ANOVA),Welch and Kruskal-Wallis Test were used for group comparisons depending on the normality of the data. Binary logistic regression analysis was performed to analyze factors affecting Fatigue Levels. Moreover, multinomial logistic regression analysis was used to determine factors related to the MET groups. The backward Wald method was used as a variable selection method in regression analyses. Odds Ratios (OR) and its 95% confidence intervals (CI) were reported for the regression models. Univariate analyses were performed before regression analysis to determine candidate variables for the final regression models. Variables with p-value <0.2 were included in the final model as candidate variables. All analyses were conducted via R 4.2.0 (www.r-project.org) statistical software. Two-sided p<0.05 was taken as statistically significant.

RESULTS

FLET (p=0.021), MBST (p=0.004), LBT-Right (<0.001), LBT-Left (<0.001) tests were significantly higher in the group with FSS <2.3 when analyzed by dividing them into two groups according to their fatigue levels. (15) Female gender was higher in the group with FSS >2.3 (p=0.005) **(Table 1).**

A significant correlation was found with MET level in all of the FLET, MBST, LBT-Right, LBT-Left tests. A significant correlation was found between FSS and MBST (p= 0.004), LBT-Right (p<0.001), LBT-Left (p<0.001) values. The group with FSS <2.3 had higher FLET, MBST, LBT-Right, LBT-Left values. A significant correlation was found between female gender and FLET (p<0.001), MBST (p<0.001), LBT-Right (p<0.001), LBT-Left (p<0.001). Female gender was associated with decreased FLET, MBST, LBT-Right, LBT-Left levels **(Table 2).** On the other hand, no significant relationship was found between MET groups and BMI (p=0.329), smoking (p=0.154), alcohol (p=0.933) and low back pain (p=0.08) **(Table 3)**.

Gender (p=0.049), MBST (p=0.003) and MET 3 (p=0.025) were determined as factors affecting fatigue in the regression model. Female gender was determined as a risk factor for fatigue (OR= 0.376; p= 0.049). Additionally, 1-point increase in the MBST test reduces fatigue by 1.14% (OR= 0.986; p= 0.003) **(Table 4).**

Factors related to the MET groups showed that MET=1 (inactive) group was found to be related to FLET (OR=0.987, p=0.022), LBT (right) (OR=1.053, p=0.008), (OR=0.943, p=0.004); while MET=2 (moderate-active) group was observed to be associated with lateral LBT (left) (OR=0.958, p=0.044) and FLET (OR=0.986, p=0.024). Age, gender, BMI, smoking, alcohol, and low back pain are not risk factors for physical inactivity **(Table 5)**.

Figure 1. Trunk flexors endurance test

Figure 2. Modified biering-sorensen test

Figure 3. Lateral bridge test

DISCUSSION AND CONCLUSION

The results of our study show that fatigue and physical inactivity are common problems in medical school students. In the literature, it has been reported that the relationship between physical activity and core endurance is still unclear in current studies (12). The relationship between endurance and physical activity levels in different populations has been examined. For example, only the lateral bridge test was found to be associated with physical activity level among core endurance tests in patients with Ankylosing Spondylitis (13). Bayraktar et al., in their study evaluating core endurance and physical activity level in young adults, reported that core endurance tests were not associated with physical activity regardless of gender (16). In another study using the IPAQ to evaluate the level of physical inactivity, they found no relationship between the fore-plank and side-plank times of university students and the level of physical activity (2). The findings of this study, unlike the literature; all four tests evaluating core endurance were significantly higher in the physically active group. Physical inactivity was determined as a risk factor for trunk flexor and right-left lateral flexor muscle endurance.

When the relationship between gender and endurance was evaluated in the literature, while male participants showed higher endurance in the lateral bridge test no difference was found in terms of gender in the trunk flexor and endurance tests (16). In another study, both fore-plank and lateral plank values were longer in male participants. According to the results of this study, all of the core endurance measurements were higher in male students.

It has been reported in the literature that no relationship was found between BMI and endurance time (2). According to the results of this study, BMI and core endurance values are related to each other. No relationship was found between BMI and fatigue and physical activity.

In the literature, it has been reported that core endurance tests are correlated with each other (17). According to the results of our study, all four measurement methods used for core endurance measurement were related to each other. Additionally, a low core endurance measurement was found to be a risk factor for other measurements to be low as well.

In a study of university students, female students reported more fatigue (18). In our study, female gender was detected more in the group reporting higher fatigue. However, gender was not found to be a risk factor for fatigue. Age and body mass index was not associated with fatigue. In a study evaluating the relationship between core endurance, fatigue, and physical activity in patients with ankylosing spondylitis, it was reported that high fatigue levels were associated with decreased lateral bridge and trunk extensor test duration (13). Additionally, according to the findings of our study, students in the group who reported more fatigue performed lower in all core endurance tests. This result shows us that decreased core endurance may be associated with fatigue. Additionally, the results of this study showed that in addition to the psychosocial risk factors of fatigue in university students, physical inactivity and decreased core endurance was also risk factor. To the best of our knowledge, this is the first study in the literature on this subject. This situation is important in terms of preventive medicine. It is thought that interventions to increase the physical activity level of university students can increase the quality of life by also affecting the fatigue level of the students.

Our study was conducted with medical faculty students. In the literature, it has been reported that medical school students know more about the benefits of physical activity, yet they are as inactive as other students (19). Considering the relationship between physical activity and gender; it has been reported that female gender is more inactive than male gender in university students (19, 20). The results of this study also support this. In this study, when the groups were compared according to MET values, the mean age of the physically inactive group was significantly higher. Considering that the study was conducted with medical faculty students, the course load of medical faculty education increases as the academic year progresses. We have associated increased physical inactivity at older ages with this. It may be useful to examine this issue in future studies.

In the literature, it has been reported that the female gender is more inactive than the male gender for university students as well as for other age groups. (21). The results of this study support this knowledge. Female gender was identified as a risk factor for physical inactivity. Recent studies have also reported more physical inactivity among university students and smokers (22). According to the results of this study, there is no relationship between the physical activity level and smoking. Additionally, smoking is not a risk factor for physical inactivity. The relationship between physical activity and alcohol is unclear in the literature. However, it has been reported that the physical activity level of students who drink alcohol is higher than those who do not drink (23). According to the findings of this study, no relationship was found between drinking alcohol and physical activity. Drinking alcohol was not a risk factor for physical inactivity. Alcohol, smoking, and physical inactivity are considered unhealthy living habits. Our study was conducted with medical faculty students. It has been reported that the awareness of these students about healthy living habits is higher than university students studying in other departments (19). All of these suggest that physical inactivity is related to the physical facilities of university life, transportation, and increased course load, rather than being a part of unhealthy living habits.

No correlation was found between low back pain and fatigue, physical activity and endurance. It is known that patients with nonspecific low back pain have decreased core endurance (24). Our study was conducted in healthy young adults and their previous low back pain was examined. The fact that the prevalence of low back pain increases in older ages and the questioning of low back pain history instead of current low back pain may have affected the results of the study.

In the literature, it has also been reported that there are differences in the classification of patients in terms of physical activity level. In this study, we divided the participants into three groups according to the level of physical activity but also studies that divided participants into two groups (13). The data of our study were obtained in the first year when the COVID-19 pandemic receded and face-to-face education began. Studies have shown that the COVID-19 pandemic affects the fatigue level of university students (25). Therefore, this should be taken into consideration when evaluating the data of this study.

The most important limitation of this study is its cross-sectional nature. The absence of a control group is another limitation. Despite all these limitations, the strengths of the study are that the sample is large and the sample is a specific group. Additionally, we used not only self-report questionnaires but also a quantitative measurement of core endurance times.

According to the results of this study; decreased core endurance and physical inactivity are risk factors for fatigue in medical faculty students. Female gender, decreased core endurance is a risk factor for fatigue. While age, gender, body mass index, smoking, alcohol and low back pain are not considered as risk factors for physical inactivity; decreased core endurance is a risk factor. Considering all these risk factors in university students, it is important in terms of preventive medicine to make interventions to improve their physical activity levels, so that lifelong habits are gained during the university period. We recommend that future studies with well-designed interventions be conducted in this population.

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Conflict-of-interest and financial disclosure

The authors declare that they have no conflict of interest to disclose. The authors also declare that they did not receive any financial support for the study.

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