MUSCULOSKELETAL DISORDERS AND ITS RELATION TO PSYCHOLOGICAL DISTRESS AMONG MEDICAL STUDENTS SUBJECTED TO ONLINE LEARNING DURING COVID-19 PANDEMIC

BY

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Abstract

Introduction: Social isolation began in 2020 because of the new coronavirus pandemic, and online classes began as a distant learning strategy to replace classroom-based study routines. As a result, over a longer period, medical students adopted a different physical posture than usual, potentially raising the risk of musculoskeletal pain. **Aim of Work:** To calculate the percentage of musculoskeletal disorders (MSD) and its associated factors among undergraduate Ain Shams medical students subjected to online learning during the COVID-19 pandemic, and to find out the association between MSD, and psychological distress including anxiety, depression and stress. **Materials and Methods:** A cross sectional study was conducted among adults aged 18 years old or more from both genders. A convenience sample of 340 medical students were included in the study through an anonymous English self-administered questionnaire. The questionnaire was divided into five sections: sociodemographic characteristics, academic related and health related conditions, Standardized Nordic Questionnaire and Depression, Anxiety and Stress Scale -21 items (DASS-21). **Results:** The participants mean age was 21.38 ± 1.6. Among the participants, 59.4% were females, all of them were single, and 80.7% were from urban areas. The percentage of students with musculoskeletal complaints was (53.8%) before the COVID-19 pandemic but increased to 73.1% during the pandemic. Neck pain was the most common musculoskeletal disorder with 50.6%, followed by low back pain (8.2%) in the studied sample. There were statistically significant associations between age, female gender, residence, depression, anxiety and occurrence of MSDS (p<0.05). As regards academic related characteristics, longer sitting hours per day for online studying, static head posture, and awkward posture in which the back was bent or twisted were statistically significantly associated with MSDs (p<0.05). **Conclusion and Recommendations:** There was an increased incidence of musculoskeletal pain among undergraduate medical students subjected to remote learning. Authorities must be aware of this health issue to develop strategies and effective initiatives, and programs.

Keywords: Musculoskeletal pain, Medical students, Remote teaching, and COVID-19.

Introduction

The term musculoskeletal disorders (MSDs) could be defined as "conditions which contain more than 150 diagnoses that affect the locomotor system; that is, muscles, bones, joints, and related tissues such as tendons and ligaments, as specified in the International Classification of Diseases. (WHO, 2020).

Pain, movement constraints, lack of skills, and impaired functional abilities are all common symptoms of musculoskeletal diseases. People's capacity to work and collaborate in social roles was also harmed (Amro et al., 2020). . According to a survey done by the Brazilian Institute of Geography and Statistics (IBGE, 2017), about 27 million Brazilians aged 18 years or over suffered from musculoskeletal pain

Musculoskeletal pain has a significant influence on students because, in addition to producing discomfort, it can limit students' leisure time, cause psychological stress, and increase financial costs due to more specialized health care services. Furthermore, recurring musculoskeletal pain can have a negative impact on students' academic achievement as well as their future working capability and

health when they move from university to professional life (Murray et al., 2020).

Some researchers have detected a link between psychological disturbance and the beginning of MSD (Nahit et al., 2013). Medical students are known to have a high prevalence of psychological distress due to their academic pressure, which puts them under a lot of stress compared to their classmates and the general population (Melaku et al., 2015). According to studies conducted in the United States and Canada among medical students, they have a high rate of depression and anxiety, with a considerable rise in psychological discomfort when compared to the general population (Liselotte et al.,2016).

Due to the Corona epidemic in Egypt in 2020, the faculty of Medicine at Ain Shams University, like other Egyptian universities, had to switch to online teaching methodologies. The challenge for medical students extended beyond the faculty who had to change their teaching methods to the students themselves who had to acquire skills and abilities in the new system. This all happened when the students were dealing with unexpected COVID-19

Pandemic that had a significant influence on their mental health (Kecojevic et al., 2020).

There were just few Egyptian researches that looked at the impact of the lockdown period and online learning on medical students› musculoskeletal health.

Aim of Work

To calculate the percentage of musculoskeletal disorders and its associated factors among undergraduate Ain Shams medical students subjected to online learning during the COVID-19 pandemic, and to find out the association between MSD, and psychological distress including anxiety, depression and stress.

Materials and Methods

Study design: A cross sectional study was conducted.

Study Setting, population and duration: The study was carried out among Ain Shams University undergraduate medical students who were exposed to online learning in their different educational years from April to June 2022. Exclusion criteria: First year students in the mainstream and extended modular program (EMP) students will be excluded as they attend their lectures face to face.

Study sample: Convenience sample was used. By using PASS11 program for sample size calculation, setting confidence level at 95%, and margin of error at 5%, it is estimated that sample size of 340 students will be needed to detect an expected prevalence of MSDs among medical students of 67% (Gomes et al., 2021).

Study methods:

Data collection tools: An English anonymous self-administered **questionnaire** was distributed to the students, the questionnaire composed of five sections with different types of questions:

A : **Socio-demographic data** such as age, gender, marital status, having children, and residency.

B: **Academic related conditions** such as academic year, hours of laptop or tablet use per day to attend the online settings, average online studying sitting hours per day, static head down posture, awkward posture, and use of comfortable back support.

C: **Health-related conditions** such as height, weight, smoking status, physical activity, sleeping hours per day, presence of chronic diseases, and receiving medications for musculoskeletal pain in the last month.

D: **The English version of Standardized Nordic questionnaire (SNQ)** which is used to measure MSD (Kuorinka et al., 1987). It is a well validated instrument used to analyze the musculoskeletal symptoms in an ergonomic or occupational health context and has been used extensively in many countries around the world for the MSD study in various groups of subjects. It has a good to very good test–retest reliability (k = 0.6–0.81), an internal consistency from good to acceptable (Kuder–Richardson 20 = 0.74–0.87) (López et al., 2017).

It has two main parts: The first part evaluates general health problems of musculoskeletal system at different positions on the body during the last 12 months and within the last 7 days. The second part assesses the consequences of pain on activities. This part of the questionnaire is modified so that it complies with the circumstances and the aim of this research, in this way the questions: "Have you had any pain or discomfort in the last 12 months?" was modified to "Have you had any pain or discomfort before starting online learning after Covid 19 pandemic?" The question "Have you had any muscular problem (pain or discomfort) during the last 7 days?", has been modified to "Have you had any pain or discomfort during the days you were subjected to online learning after Covid19 pandemic?" Thus, for the analysis of the results, the total number of painful areas identified is used. It consists of 40 questions with Yes/No answers about any musculoskeletal pain or discomfort experienced before and after COVID-19 and regarding the impact of pain on activities. All the questions refer to nine areas: neck, shoulders, elbows, wrists, the upper part of the back, the lower part of the back, hips, knees, and ankles.

E: **Depression, Anxiety and Stress Scale - 21 Items (DASS-21):** It's a well-validated questionnaire that has been used to assess psychological discomfort in a variety of study subjects (Lovibond, and Lovibond, 1995). It's a collection of three self-report scales that are used to evaluate depression, anxiety, and stress. Each of the three DASS-21 scales has seven items that are divided into subscales with similar content. Summing the scores for the relevant elements yields depression, anxiety, and stress scores. The following are recommended cut-off scores for conventional severity designations (normal, mild, moderate, and severe): normal (stress [S] 0-14, anxiety [A] 0-7, & depression [D] 0-9),

mild [S] 15-18, [A] 8-9, & [D] 10-13), moderate ([S] 19-25, [A] 10-14, & [D] 14-20), severe ([S] 26-33, [A] 15-19, & [D] 21-27), and extremely severe ([S] ≥34, [A] ≥20, & [D ≥28). The reliability of DASS-21 in previous studies showed that it has excellent Cronbach's alpha values of 0.81, 0.89 and 0.78 for the subscales of depressive, anxiety and stress respectively. It was found to have excellent internal consistency, discriminative, concurrent, and convergent validities (Coker et al., 2018).

Consent

Following an explanation of the study's aim, all participants were asked to give their consent.

Ethical Approval

The ethical committee approval was obtained from Ethical Committee at Faculty of Medicine, Ain Shams University, consent was obtained from all participants, and anonymity was ensured using an anonymous questionnaire to ensure confidentiality of data.

Data Management

Data was collected, coded, entered on personal computer, cleaned, and analyzed using SPSS program version 25. Quantitative data was presented by mean and standard deviation. Qualitative data was presented by numbers and percentages. Suitable statistical tests were done according to the type of data obtained. A two-sided p-value ≤ 0.05 was considered statistically significant.

Results

Table (1): Overall musculoskeletal disorders before and after COVID-19 pandemic and different affected areas among the studied participants:

Variables	Total No=342 No (%)
Overall MSDs before COVID-19	
NO	158(46.2)
Yes	184(53.8)
Overall MSDs after COVID-19	
NO	92(26.9)
Yes	250(73.1)
The pain had prevented you from carrying out normal activities	
NO	256(74.9)
Yes	86(25.1)
See a physician due to this condition	
NO	284(83)
Yes	58(17)
Affected areas	
Neck	173(50.6)
Shoulders	23(6.7)
Upper back	14(4.1)
Elbow	2(0.6)
Wrist/hand	2(0.6)
Lower back	28(8.2)
Hip/thigh	2(0.6)
Knees	5(1.5)
Ankles/feet	1(0.3)

Table 1 showed that the percentage of students with musculoskeletal disorders was (53.8%) before the COVID-19 pandemic and increased to 73.1% during the pandemic. Neck pain was the most common musculoskeletal one (50.6%), followed by low back pain (8.2%). Ankle and feet pain were the least complaints (0.3%). About quarter of the students (25.1%) reported that their pain had prevented them from carrying out normal activities like working, cleaning, and practicing hobbies. Only 17% of participants have seen a physician due to their condition.

Table (2): Sociodemographic and academic related characteristics of the studied participants and its relation to musculoskeletal disorders (No =342).

Characters	No (%)	Not having -MSDs	Having MSDs	Chi square test	p	OR (95% CI)
Age (mean ± SD)	21.38±1.6					
16-20	106(31)	20(18.9)	86(81.1)	5.04	**0.03***	0.53(0.3-0.9)
21-25	236(69)	72(30.5)	164(69.5)			
Gender						
Male	139 (40.6)	50(36)	89(64)	9.79	**0.002***	2.15(1.33-3.49)
Female	203 (59.4)	42(20.7)	161(79.3)			
Residency						
Rural	66(19.3)	28(42.4)	38(57.6)	10.02	**0.002***	0.41(0.23-0.72)
Urban	276(80.7)	64(23.2)	212(76.8)			
Academic year						
Grade 2	78(22.8)	15(19.2)	63(80.8)			
Grade 3	75(21.9)	20(26.7)	55(73.3)			
Grade 4	72(21.1)	21(29.2)	51(70.8)	2.4	0.1	
Grade 5	55(16.1)	18(32.7)	37(67.3)			
Grade 6	62 (18.1)	18(29)	44(71)			
Hours of laptop/tablet use per day (Mean ± SD)	6.4 ± 3.33	6.3 ± 3.4	6.5 ± 3.4	-0.5	0.6	(-0.9-0.6)
Online studying sitting hours per day						
< 1	23(6.7)	7(30.4)	16(69.6)			
1-3	102(29.8)	43(42.2)	59(57.8)		**0.004***	
4-5	111(32.5)	18(16.2)	93(83.8)	8.09		
> 5	106(31.0)	24(22.6)	82(77.4)			
Static head posture						
NO	88(25.7)	39(44.3)	49(55.7)	18.3	**0.000***	3(1.8-5.1)
Yes	254(74.3)	53(20.9)	201(79.1)			
Awkward posture						
NO	77(22.5)	36(46.8)	41(53.2)	19.9	**0.000***	3.3(1.9-5.6)
Yes	265(77.5)	56(21.1)	209(78.9)			
Comfortable back support						
NO	226(66.1)	42(18.6)	184(81.4)	23.4	**0.000***	0.3(0.2-0.5)
Yes	116(33.9)	50(43.1)	66(56.9)			

MSDs: Musculoskeletal disorders,   OR: Odds ratio;   CI: Confidence Interval

*: Statistically significant

Table 2 showed that 59.4% of the studied group were females, and 80.7% were from urban areas. The mean age of the participants was 21.38±1.6, with second-year students being the mostly affected (22.8%). As regard academic related characteristics, the mean of hours spent on a laptop or tablet per day was 6.4 ± 3.33. About third of students (32.5%) spent about 4-5 hours per day for online studying. About three quarter (74.3%) had static head posture, 77.5% had awkward posture, and 66.1% didn't use comfortable back support when online learning.

Table (2) also revealed that MSDs were found to be statistically significantly higher among younger students (p=0.03), females compared to males (p=0.002), and students from urban areas (p=0.002). As regards academic related characteristics, longer sitting hours per day for online studying, static head posture, and awkward posture in which the back is bent or twisted were statistically significantly associated with MSDs.

Table (3): Health-related conditions among the studied participants and its relation to musculoskeletal disorders (No=342).

Health related conditions:	No (%)	Not having MSDs	Having MSDs	Tests	p	OR (95%CI)
BMI						
Underweight	11(3.2)	5(45.5)	6(54.5)	4.9 [a]	0.28	
Normal weight	199(58.2)	58(29.1)	141(70.9)			
Overweight	93(27.2)	23(24.7)	70(75.3)			
Obese	31(9.1)	5(16.1)	26(83.9)			
Morbid Obesity	8(2.3)	1(12.5)	7(87.5)			
Having chronic diseases						
NO	321(93.9)	88(27.4)	233(72.6)	0.7	0.4	1.6(0.53-
Yes	21(6.1)	4(19)	17(81)			4.9)
Smoking Status						
Never smoke	331(96.8)	90(27.2)	241(72.8)	0.96[a]	0.74	
Ex-smoker	3(0.9)	1(33.3)	2(66.7)			
Current smoker	8 (2.3)	1(12.5)	79(87.5)			
Sleeping hours per day						
≤ 6	66(19.3)	19(28.8)	47(71.2)	0.13	0.7	
7-8	222(64.9)	59(26.6)	163(73.4)			
≥9	54(15.8)	14(25.9)	40(74.1)			
Practicing physical exercise						
NO	227(66.4)	57(25.1)	170(74.9)	1.1	0.29	0.77(0.47-
Yes	115(33.6)	35(30.4)	80(69.6)			1.26)
Receive medications for musculoskeletal pain last month						
NO	291(85.1)	86(29.6)	205(70.4)	6.98	**0.008***	3.15(1.29-
Yes	51(14.9)	6(11.8)	45(88.2)			7.65)

MSDs: Musculoskeletal disorders   BMI: Body Mass Index,   [a]: Fisher's Exact test

OR: Odds ratio;   CI: Confidence Interval   *: Statistically significant

Table 3 showed that MSD was higher among obese, having chronic diseases, current smoker, who didn't practice physical exercise and who receive medications for musculoskeletal pain last month; although statistically non-significant except for the last one.

Table (4): Association between musculoskeletal disorders and depression, anxiety and stress among the studied participants No =342:

Variables	Not having MSDs No %	Having MSDs No %	Chi square test	p	OR (95%CI)
Depression NO Yes	16(17.4) 76(82.6)	10(4) 240(96)	17.17	**0.000***	2.2-)5.1 11.6)
Anxiety NO Yes	11(12) 81(88)	7(2.8) 243(97.2)	#	**0.002***	4.7(1.8-12.6)
Stress NO Yes	31(33.7) 61(66.3)	50(20) 200(80)	6.9	0.008	2(1.2-3.5)

MSDs: Musculoskeletal disorders   #: Fisher's Exact test   *: Statistically significant

Table (4) showed that MSDs were statistically significantly higher among students with depression and anxiety (p=0.000 and 0.002 respectively).

Table (5): Multivariate logistic regression analysis for predictor variables of musculoskeletal disorders among the studied participants (No =342).

Variables	B	p value	OR	95% CI	
				Lower	Upper
Gender (female)	0.65	**0.03***	1.9	1.1	3.4
Age/years (21-25)	-0.63	**0.05***	0.53	0.3	1
Online studying sitting hours per day< 11-34-5> 5	--0.31.10.5	0.0010.6**0.05***0.4	-0.73.21.6	-0.210.5	-2.210.15.2
Awkward posture (yes)	0.93	**0.004***	2.5	1.3	4.8
Comfortable back support (yes)	-0.94	**0.001***	0.39	0.2	0.7
BMIUnderweightNormal weightOverweightObeseMorbid Obesity	-0.71.122.4	0.080.30.1**0.02***0.09	-2.12.97.710.8	-0.50.71.40.7	-8.412.443.4161.5
Hours of laptop use per day	-0.03	0.5	0.9	0.9	1.1
Constant	-0.3	0.7	0.7		

BMI: Body Mass Index   OR: Odds ratio   CI: Confidence interval

*: Statistically significant

Multivariate binary logistic regression analysis of factors associated with MSDs revealed that being a female; OR (95%CI) = 1.9(1.1-3.4), sitting 4-5 hours for online studying; OR (95%CI) = 3.2(1-10.1), with awkward posture; OR (95%CI) = 2.5 (1.3-4.8), and being obese; OR = 7.7 (1.4-43.4), were independent predictors of MSDs. While older age; OR (95%CI) = 0.53(0.3-1), studying less hours (1-3 hours); OR (95% CI) = 0.7 (0.2-2.2) and using comfortable back support during studying; OR (95%CI) = 0.39 (0.2-0.7) were protective factors of MSDs as shown in Table 5.

Discussion

The social distance resulting from the COVID-19 pandemic prevailing in 2020 and 2021 has forced medical students around the world to continue their study and research using information and communication technology (ICT). Therefore, higher education institutions are increasingly using ICT and the Internet to compensate for the lack of face-to-face education in classes.

The current study showed that the percentage of students with musculoskeletal disorders was 53.8% before the COVID-19 pandemic and increased to 73.1% during the pandemic (Table 1). This finding agreed with Gomes et al., 2021 whose results showed that before starting the online, 63.6% of their studied students did not complain of any type of musculoskeletal pain, but after the pandemic, this percentage increased as follows: 33.1% reported no pain and 66.9% had the feeling of some degree of musculoskeletal pain.

Neck pain was the most frequent musculoskeletal complains among the studied group, with (50.6%) followed by low back pain (8.2%) and ankle and feet pain being the least ones (0.3%) (Table1). These findings were consistent with Yaseen and Salah, 2021 who studied the impact of e-learning during COVID-19 pandemic on students' body aches in Palestine and their results showed that neck pain was the most common musculoskeletal condition representing 32.2% of participants. Meanwhile, according to Gomes et al., 2021, 68% of the participating medical students in Brazil reported back pain and 33% reported neck pain. Karingada, and Sony, 2021 on their study on the demonstration of the relationship between MSD and online learning during the COVID-19 pandemic in India showed that about 80% of students have reported head, neck, and eye MSD symptoms since they started learning online. Neck pain was the most common type of pain, this may be because the head was not on the same level of the laptop/mobile most of the time and compression of its nerves leading to numbness and tingling and consequently sensation of pain.

There was a statistically significant association between age, gender, residency, and the occurrence of MSDs (p<0.05) among the studied group (Table 2). A study conducted by Mohamed (2021) among Kasr-Alainy

Hospital medical students and

found a significant association between age and musculoskeletal disorders with p- value= (<0.01). He compared between medical students who were studying clinical sciences in their last years of college with younger ones who were studying academic sciences in their first years and are more exposed to online learning and spend more time in front of laptops and mobile devices, that is why MSDs was significantly higher among younger students.

Females were complaining more of musculoskeletal pain compared to males, and the difference was statistically significant (Table 2). This was consistent with the findings of a study conducted by Hendi et al., 2021 who showed significant association between female gender, and musculoskeletal disorders with p-value (<0.001). MSDs were widespread in both male and female undergraduate Nigerian students, according to Ekpenyong et al., 2013 although there was a stronger correlation between MSDs and the female gender, with 64.8% of females reporting MSDs, compared to just 35.2% of males. This high prevalence might be explained by somewhat smaller body frame and decreased female muscular tone

according to Khan and Chew, 2013. In addition, Hasan et al., 2018 on their study on frequency of musculoskeletal pain and associated factors among undergraduate students in India; showed that females had higher percentage of musculoskeletal pain, (25.42% and 74.5% in male and female medical students) respectively.

Furthermore, there was a statistically significant association between residency and the occurrence of MSDs being higher in urban areas (Table 2) which could be explained by the fact that rural areas may be subjected to a weak network, resulting in more instability of the internet connection and missing the session, as well as the small number of rural residents compared to urban residents, which leads to this statistically significant difference.

Yaseen and Salah, 2021, found that gender-based difference in e-learning laptop and tablet use tended to be longer among females compared to males, (mean of hours sitting in front of laptop was 6.38 in females vs. 5.09 in males), p < 0.001. This could be explained by the fact that females were more likely than males to use desktops, laptops, or tablets for e-learning for longer periods of time, as well as the largest

percentages of participants sitting in chairs, lying on their backs, and leaning forward for lengthy amounts of time were females.

Gomes et al., 2021, who conducted a Brazilian study found that musculoskeletal pain caused by remote e- learning was generally less severe, as 66.9% of those who reported symptoms were not using any medicine to ease them. This result was supported by the findings of the current study, as 85.1% did not use medications to relieve musculoskeletal pain, whereas only 15% did (Table 2).

About one third of participated medical students (32.5%) spent 4-5 hours online per day in front of the screen to study during the pandemic (Table 2). Yaseen and Salah, 2021, showed that 46.8% of participants used desktops, and laptops daily. They showed statistically significant associations between online studying hours, and awkward posture and MSDs. Long hours of online learning per day was the major risk factor for the development of musculoskeletal pain. Most of the students did not have the proper and safe posture to sit in front of a computer or phone (Gomes et al., 2021). A study conducted by

Kanchanomai, 2011 reported that a poor sitting position was associated with neck pain among undergraduate students. Another study in Saudi Arabia carried out by Gharib and Hamid, 2013 revealed that medical students spent more time in sitting position for their online academic activities as: reading, writing and computer use.

The current study showed that 74.3% and 77.5% of medical students had a static head posture and an awkward posture respectively. Both postures were statistically associated with MSDs (Table 2). In a study conducted by Weleslassie et al., 2020 in Mekelle University, College of Health Sciences Tigray, Ethiopia, found that 95.5% of medical students used a computer or a tablet, while 55.8% of them didn't use a comfortable back support. Moreover, 51.1% of participants had a static head down posture, and 39.1% had an awkward neck posture for at least 2 hours per day. Additionally, they revealed that the prevalence of neck pain was significantly higher among students who used laptop or tablet and sat with a static head down posture for more than 2 hours during a lecture.

MSDs had a statistically significant association with depression and anxiety

among the studied group (p=0.000 and 0.002 respectively) (Table 4); about 96% of the students who were complaining of MSD had depression and 97.2% had anxiety. This may be due to that pain interferes with daily activities and can have detrimental psychological effects like depression and anxiety. These findings matched those of a cross-sectional study conducted by Sartang et al., 2017 on 70 military personnel in a military headquarters in Iran and they found a statistically significant positive correlation between anxiety and depression and musculoskeletal disorders, necessitating the improvement of workplace ergonomics to reduce anxiety and depression in the surrounding work environment.

Multivariate binary logistic regression analysis of factors associated with MSDs among the studied group revealed that being a female; OR= 1.9, sitting 4-5 hours for online studying; OR = 3.2, awkward posture; OR = 2.5, and being obese; OR = 7.7, were independent predictors of MSDs (Table 5). These results agreed with those of Alshagga et al., 2013 who found that daily hours of computer use (OR = 1.1, 95% C.I 1.1-1.2, p = 0.038), and increasing Body Mass Index (BMI) (OR = 1.1, 95% CI 1.0-1.1, p = 0.03), were the predictors associated with MSDs on multiple logistic regression analysis of their studied group.

Yaseen and Salah, 2021 results showed that the duration of desktop, and laptop use for e-learning was significantly associated with the duration of pain when analyzing predictors of pain severity and showed that sitting in a wrong position was significantly associated with the female gender (p <0.01).

Conclusion: The percentage of musculoskeletal diseases has increased during the COVID-19 pandemic among medical students subjected to remote learning. Female gender, age, longer sitting hours per day for online studying was significant predictors for occurrence of MSDS (p<0.05).

Recommendations: During COVID-19 pandemic, a study of MSD related to online learning among students is needed so that medical professionals can design online learning with the MSD impact on students in mind. It is critical for faculty authorities to identify modifiable MSD risk factors and to prepare early supportive and preventive interventions for future doctors in order to improve their quality of life.

Universities and medical practitioners should direct medical students to the appropriate position during e-learning and teach them how to improve core flexibility and strength through a series of upper and lower body stretch and resistance exercises. Furthermore, increasing and stretching physical exercise that can be done at home can help individuals with chronic pain improve their pain threshold and keep their pain from worsening. Universities can also develop strategies to better adapt to the current reality of blended learning, which is a combination of face-to-face education and remote e-learning to alleviate the impact of this new teaching method on student health.

Conflict of Interest

The authors declared that there was no conflict of interest.

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