



ORIGINAL ARTICLES. PHYSICAL EDUCATION

Comparative analysis of the musculoskeletal system disorders and the stress level of sports faculties students in Indonesia and Malaysia

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Abstract

Purpose: to determine the comparative analysis of disorders of the musculoskeletal system and the level of stress of students of sports faculties in Indonesia and Malaysia.

Material and methods. 316 students of the Faculty of Sports Science of Indonesia and Malaysia were sampled from this study: 159 students of the Faculty of Sports Science of Indonesia, and 157 students of Sports Science of Malaysia. This research is a comparative analytical observational descriptive study conducted with a cross-sectional approach. This research was conducted in several universities both in Indonesia and Malaysia. The subjects of this study were students from Indonesia and Malaysia who took part in online learning by the criteria of inclusion and exclusion. The instrument used to collect data was a questionnaire for musculoskeletal disorders using a Nordic Body Map while a stress level questionnaire used an MSSQ (Medical Student Stressor Questionnaire). Data analysis techniques use descriptive tests through percentage distribution and comparison tests.

The results. Based on the results of the Independent Sample t-test, a calculated t-value of 4.076 with a significance value of 0.000 was obtained. Because the significance value of 0.000 is smaller than 0.05 ($p < 0.05$), it can be concluded that there is a significant difference in musculoskeletal disorders between Indonesian and Malaysian students. The most common musculoskeletal disorder experienced by Malaysian students is a disorder of the lower back with an average of 3.15. Based on the results of the Independent Sample t-test analysis, a calculated t-value of 3.624 with a significance value of 0.000 was obtained. Because the significance value of 0.000 is less than 0.05 ($p < 0.05$), it can be concluded that there is a significant difference in stress levels between Indonesian and Malaysian students. Based on the results of the analysis, the average value of stress levels in Indonesian students was 15.66 while the average value of stress levels in Malaysian students was 17.77. It can be interpreted that students from Malaysia have a higher level of stress compared to Indonesian students.

Conclusions. Based on the results of the study, it can be concluded that: Malaysian students experience higher musculoskeletal disorders in the lower back and high-stress levels due to online learning compared to Indonesian students.

Keywords: comparative, disorders, musculoskeletal, level stress



Анотація

Ріна Юніана, Томоліус, БМ Вара Кушартанті, Ахмад Насруллох, Керіка Рісмайанті, Сулістійоно, Мухамад Ічсан Сабілла, Роксана Дев, Омар Дев, Гунатеван Елумалай. Порівняльний аналіз розладів опорно-рухового апарату та рівня стресу студентів спортивних факультетів Індонезії та Малайзії

Мета: Метою даного дослідження є визначення порівняльного аналізу порушень опорно-рухового апарату та рівня стресу студентів спортивних факультетів Індонезії та Малайзії.

Матеріал і методи. З цього дослідження було відібрано 316 студентів факультету спортивних наук Індонезії та Малайзії: 159 студентів факультету спортивних наук Індонезії, 157 студентів спортивної науки Малайзії. Це дослідження являє собою аналітичне спостережне описове дослідження, проведене з підходом поперечного перерізу. Це дослідження проводилося в декількох університетах як Індонезії, так і Малайзії. Предметами цього дослідження стали студенти з Індонезії та Малайзії, які брали участь в онлайн-навчанні відповідно до критеріїв інклюзії та виключення. Інструментом, який використовувався для збору даних, був опитувальник щодо порушень опорно-рухового апарату за допомогою скандинавської карти тіла, тоді як опитувальник рівня стресу використовував опитувальник MSSQ (Medical Student Stressor Questionnaire). Методи аналізу даних використовують описові тести за допомогою тестів відсоткового розподілу та порівняння.

Результати. За результатами тесту Independent Sample t було отримано розрахункове значення $t = 4,076$ зі значенням значущості $0,000$. Оскільки значення значущості $0,000$ менше, ніж $0,05$ ($p < 0,05$), можна зробити висновок, що існує значна різниця в порушеннях опорно-рухового апарату між індонезійськими та малайзійськими студентами. Найпоширенішим розладом опорно-рухового апарату, з яким стикаються малайзійські студенти, є розлад попереку з середнім показником $3,15$. За результатами аналізу тесту Independent Sample t було отримано розрахункове значення $t = 3,624$ зі значенням значущості $0,000$. Оскільки значення значущості $0,000$ менше $0,05$ ($p < 0,05$), можна зробити висновок, що існує значна різниця в рівнях стресу між індонезійськими та малайзійськими студентами. За результатами аналізу, середнє значення рівня стресу в індонезійських студентів становило $15,66$, тоді як середнє значення рівня стресу у малайзійських студентів становило $17,77$. Можна інтерпретувати, що студенти з Малайзії мають більш високий рівень стресу в порівнянні з індонезійськими студентами

Висновки. На основі результатів дослідження можна зробити висновок, що: малайзійські студенти відчувають більшу кількість опорно-рухових розладів у нижній частині спини та високий рівень стресу через онлайн-навчання порівняно з індонезійськими студентами.

Ключові слова: онлайн-навчання, порушення опорно-рухового апарату, стреси

Аннотация

Рина Юниана, Томолиус, БМ Вара Кушартанти, Ахмад Насруллох, Керика Рисмайанти, Сулистистоно, Мухаммад Ичсан Сабилла, Роксана Дев, Омар Дэв, Гунатеван Элумалай. Сравнительный анализ расстройств опорно-двигательного аппарата и уровня стресса студентов спортивных факультетов Индонезии и Малайзии

Цель: определить сравнительный анализ нарушений опорно-двигательного аппарата и уровня стресса у студентов спортивных факультетов Индонезии и Малайзии.

Материал и методы. В этом исследовании приняли участие 316 студентов факультета спортивных наук Индонезии и Малайзии: 159 студентов факультета спортивных наук Индонезии и 157 студентов факультета спортивных наук Малайзии. Это исследование представляет собой сравнительное аналитическое наблюдательное описательное исследование, проведенное с использованием перекрестного подхода. Это исследование проводилось в нескольких университетах Индонезии и Малайзии. Объектами исследования стали студенты из Индонезии и Малайзии, принявшие участие в онлайн-обучении по критериям включения и исключения. Инструментом, используемым для сбора данных, был вопросник для скелетно-мышечных заболеваний с использованием Nordic Body Map, в то время как вопросник об уровне стресса использовал MSSQ (опросник для студентов-медиков). Методы анализа данных используют описательные тесты через процентное распределение и сравнительные тесты.

Результаты. На основании результатов t-критерия независимой выборки было получено расчетное t-значение $4,076$ со значением значимости $0,000$. Поскольку значение значимости $0,000$ меньше, чем $0,05$ ($p < 0,05$), можно сделать вывод о значительной разнице в нарушениях опорно-двигательного аппарата между индонезийскими и малайзийскими учащимися. Наиболее распространенным заболеванием опорно-двигательного аппарата, с которым сталкиваются малайзийские студенты, является заболевание нижней части спины со средним баллом $3,15$. На основании результатов анализа t-теста независимой выборки было получено расчетное t-значение $3,624$ со значением значимости $0,000$. Поскольку значение значимости $0,000$ меньше $0,05$ ($p < 0,05$), можно сделать вывод о значительной разнице в уровнях стресса между индонезийскими и малайзийскими учащимися. По результатам анализа среднее значение уровня стресса у индонезийских студентов составило $15,66$, а среднее значение уровня стресса у малайзийских студентов - $17,77$. Можно интерпретировать, что студенты из Малайзии имеют более высокий уровень стресса по сравнению с индонезийскими студентами.

Выводы. На основании результатов исследования можно сделать вывод о том, что у малайзийских школьников наблюдаются более высокие нарушения опорно-двигательного аппарата в нижней части спины и высокий уровень стресса из-за онлайн-обучения по сравнению с индонезийскими учащимися.

Ключевые слова: сравнительные, нарушения, опорно-двигательный аппарат, уровень стресса



Introduction

The covid-19 pandemic is still ongoing and has not faced any bright spots to end soon. This can be seen with the emergence of new variants of the covid virus that have a greater rate of spread and transmission. Moreover, in some countries, there is still an increase in the covid-19 problem, which is caused by the continued rapid spread of the covid-19 virus originating from various variants and the shrinking level of human understanding to always comply with regulations by health protocols that have been inaugurated. Throughout the COVID-19 pandemic, all human activities and routines face changes [1, 2]. Lectures, school, or office activities are all tried to be limited. The restrictions are carried out by government regulations aimed at reducing the rate of accumulation of covid problems every day. The formation of the COVID-19 pandemic shows that there is a health crisis in humans almost all over the world [3, 4]. This incident not only caused a crisis.

Health only but the education sector has also been affected by the COVID-19 pandemic. There is an education crisis, so the government issued a policy to carry out learning activities from home and work from home. Based on the determination of the Ministry of Education and Culture issued a Circular Letter from the Minister of Education and Culture Number: 36962 / MPK. A/HK/2020 dated March 17, 2020, concerning Online Learning and Working from Home to Prevent the Spread of Corona Virus Disease (COVID-19). The issuance of the Circular resulted in changes to the learning process. The learning process that is carried out has shifted from face-to-face learning to online learning.

Education is one of the determining aspects of the future success of a nation and education plays a very meaningful role in improving human energy sources that are professions [5, 7]. Education is a humane process created through a process of activity between educating and educating [5, 8, 9].

The progress of a nation is not only seen from the advancement of technology but one of them is from the success of the quality of education because education is support for human energy sources in increasing knowledge and science so that they can produce technology for the development of the nation Quality education must be supported by various components, one of which is the educational process [10, 11]. Education is the encouragement

given by educators so that the process of acquiring knowledge and knowledge, skills, and character abilities can be established, and making behaviors and beliefs in students. In other words, education is a process to help students learn well [9].

Learning identified with the word "teaching" comes from the basic word "teach" which means instructions given to people to be known (followed), the word teaching is added with the prefix "pe" and the suffix "an becomes "learning", which means the process, deed, way of teaching or teaching so that students are willing to learn. Learning is the process of interaction of learners with educators and learning resources in a learning environment [6, 12]. Online learning is defined as the experience of knowledge transfer using media such as moving images (video), sound (audio), images (photos), communication with text or writing, software, and the support of internet networks [7]. The implementation of online learning requires supporting equipment so that the learning process can take place smoothly. The devices used in the online learning process are laptops, cellphones, or computer devices that can be used to access the internet, making it easier to receive and send information or learning materials. Many learning media can be used, namely through several services such as google classroom, google meet, WhatsApp, and social media such as Facebook and Instagram [8, 13, 14].

Online learning can have both positive and negative impacts. The positive impact of online learning is that online learning has flexibility in its implementation and can encourage the emergence of learning independence and motivation to be more active in learning; Distance learning encourages the emergence of social distancing behaviors and minimizes the emergence of student crowds so that it is considered to reduce the potential spread of Covid-19 in the campus environment [15, 16]. The negative effects of online learning are the number of students or children who cannot absorb the material, limited supporting facilities, the relationship between students and students, the number of dropout cases, and mental and psychological health disorders. [12, 17].

Online learning that is still ongoing today can have a positive and negative effects [18]–[20]. The positive effect obtained from online learning is that one of the learning processes can continue even though it does not occur face-to-face and can be done wherever they are. However, it is different from the negative effects caused by online learning.



The implementation of online learning results in everyone involved, both students and teachers and lecturers having to stay silent and stare at laptops or cellphones for a long time. Even from activities that are carried out continuously with a body position and sitting that is not ergonomic, a lot of work or tasks can affect their physical and mental health, so it is not surprising that many people experience complaints about body parts, especially in the musculoskeletal system. Musculoskeletal disorders can cause pain in muscles, tissues, joints, tendons, ligaments, blood vessels, and innervation. In addition, many students who do online learning experience psychic disorders such as stress, depression, anxiety, and even unstable emotions [21, 22]. High levels of stress arise because students feel restless and depressed in understanding the material provided by the lecturer and grades that are not as expected. Even students also feel burdened by the many tasks given by lecturers. If the situation is not resolved immediately, it is feared that it will interfere with the future of students, because severe stress levels can cause a decrease in psychomotor manifestations in the form of a state of arousal, enthusiasm, activity, and work productivity as well as a decrease in concentration and thinking power [23, 24].

Along with the Covid-19 pandemic, it has caused restrictions on activities such as social isolation, recommendations to stay at home, quarantine of the entire community, and closure of educational institutions. Students as one of the individuals with the most numbers in educational institutions certainly feel the impact of the Covid-19 pandemic, where the learning system that is usually carried out face-to-face both in the campus environment and practice land has changed to online [2, 17]. The changes that have occurred in students due to the Covid-19 pandemic certainly have an impact on student psychology. Research results [21] 7.143 students showed that 0.9% of students experienced severe anxiety, 2.7% experienced moderate anxiety, and 21.3% experienced mild anxiety. The factor of online learning that results in a high level of stress in students during the Covid-19 Pandemic is a large number of learning tasks [25].

The stress experienced during online learning during the COVID-19 pandemic is caused by a lot of tasks piling up, not being able to meet with friends, being bored with the online learning process, and limitations in internet access when attending lectures and when collecting assignments. The impact felt by the student is a decrease in achievement and skills which can be seen from their semester academic scores [4]. **Purpose:** This study aims to determine the comparative analysis of disorders of the musculoskeletal system and the level of stress of students of sports faculties in Indonesia and Malaysia.

Material and methods

Methods

This research is a comparative analytical observational descriptive study conducted with a cross-sectional approach. This research was conducted at universities in both Indonesia and Malaysia.

Participants

316 students of the faculty of sports science were sampled in this research. 159 students came from the faculty of sports science, Yogyakarta State University, and 157 came from the Faculty of Sports Science, Universitas Putra Malaysia and Faculty of Sports Science and Coaching, Sultan Idris Education University who participated in online learning by the criteria of inclusion and exclusion.

Inclusion criteria 1) Sports Science Students in Indonesia and Malaysia, 2) Men and women, 3) Ages 18-25 years.

Exclusion Criteria 1) Students who experience trauma or diseases of the musculoskeletal system such as bone fractures, joint dislocation abnormalities or disorders, bone infections, and a history of bone surgery. 2) Students who have a history of chronic diseases such as chronic heart disease, chronic kidney disease, stroke, hypertension, and diabetes. 3) Students with a history of taking NSAID drugs.

Procedure

Testing was performed using a questionnaire for musculoskeletal disorders using Nordic Body. Meanwhile, the stress level questionnaire uses the MSSQ (Medical Student Stressor Questionnaire) questionnaire.

The musculoskeletal Disorders Questionnaire sheet, namely the Nordic Body Map (NBM), consists of 28 questions based on the 9 main body parts of the neck, shoulders, upper back, lower back, waist/buttocks, wrists/hands, elbows, knees, and heels/feet. Filling out the Nordic Body Map questionnaire aims to find out the body parts of students that feel pain and discomfort in students after doing online learning.

The Questionnaire sheet to measure the level of stress in students consists of several questions related to circumstances that can trigger the emergence of stress in students who take part in online learning.



Testing is carried out on each student's academic group separately. 159 subjects were tested in Indonesia and 157 subjects were tested in Malaysia. Students are tested as follows. On the first day, students filled out a questionnaire for musculoskeletal using Nordic Body. The next day, students undergo a test using the MSSQ (Medical Student Stressor Questionnaire) questionnaire to determine stress levels.

Statistical analysis

Data analysis techniques use descriptive tests through percentage distribution and comparison tests. From the data obtained, it was analyzed using SPSS to test for normality, homogeneity, and different tests using the t-test.

Results

Descriptive Analysis Results

The data of this study were analyzed using descriptive analysis by categorizing the data. The research data is categorized into 4 categories. Data on musculoskeletal disorders are categorized into very heavy, severe, mild, and very mild. Stress level data is categorized into very high, high, low, and very low. Data categorization is made based on mean values and ideal standard deviations.

The results of the categorization of research data are as follows.

Indonesia

Musculoskeletal Disorders

The categorization of data on musculoskeletal disorders in Indonesian students is presented in the following table 1:

Table 1

Categorization of Musculoskeletal Interference Data for Indonesian students

Score Interval	Frequency	Percentage (%)	Category
$x \geq 91.00$	0	0.0	Very Heavy
$70.00 \leq \text{up to} < 91.00$	54	34.0	Heavy
$49.00 \leq \text{up to} < 70.00$	75	47.2	Light
$x < 49.00$	30	18.8	Very Light
Total	159	100.0	

Source: Primary data processed 2022

Based on the table above, it is known that Indonesian students have musculoskeletal disorders as many as 0 people (0%) have very heavy disorders, 54 people (34.0%) have heavy category disorders, 75 people (47.2%) are included in the light category, and as many as 30 people (18.8%) were included in the very light category. In more detail, the musculoskeletal disorders experienced by Indonesian students are described in the following table 2.

Based on the table above it is known that Indonesian students experience stress levels as many as 0 people (0%) are included in the very high category, 41 people (25.8%) are in the high category, 98 people (61.6%) are in the a low category, and 20 people (12.6%) are included in the very low category.

Malaysia
Musculoskeletal Disorders

The categorization of data on musculoskeletal disorders in Malaysian students is presented in the following table 4.

Based on the table above, it is known that

Malaysian students have musculoskeletal disorders as many as 5 people (3.2%) have very heavy disorders, 65 people (41.4%) have heavy category disorders, 73 people (46.5%) are included in the light category, and as many as 14 people (8.9%) were included in the very light category. In more detail, the musculoskeletal disorders experienced by Malaysian students are described in the following table 5.

Based on the table above, it is known that the most common musculoskeletal disorder experienced by Malaysian students is a disorder in the lower back with an average of 3.15. The next most common disorder is a disorder in the back with an average of 2.90 and the next disorder is in the nape with an average of 2.80. It can be concluded that the most common musculoskeletal disorder experienced by Malaysian students is a disorder of the lower back.

Stress Levels

The categorization of stress level data in Malaysian students is presented in the following table 6.



Table 2

Musculoskeletal Disorders of Indonesian Students

No	Musculoskeletal disorders	Average respondent answer score
1	Disorders of the neck	1.79
2	Disorders of the nape	2.69
3	Disorders of the left shoulder	1.67
4	Disorders of the right shoulder	1.77
5	Disorders of the left upper arm	1.71
6	Disorders of the back	2.72
7	Disorders of the right upper arm	1.98
8	Disorders of the lower back/waist	3.14
9	Disorders of the hips	1.98
10	Disorders of the buttocks	2.35
11	Disorders of the left elbow	2.26
12	Interference with the right elbow	2.38
13	Disorders of the left forearm	2.42
14	Disorders of the right forearm	2.44
15	Disorders of the left wrist	2.48
16	Disorders of the right wrist	2.53
17	Disorders of the left hand	2.36
18	Disorders of the right hand	2.58
19	Disorders of the left thigh	2.56
20	Disorders of the right thigh	2.60
21	Disorders of the left knee	2.65
22	Disorders of the right knee	2.56
23	Disorders of the left calf	2.30
24	Disorders of the right calf	2.23
25	Disorders of the left ankle	1.85
26	Disorders of the right ankle	1.67
27	Disorders of the left leg	1.32
28	Disorders of the right leg	1.16

Source: Primary data processed 2022

Table 3

Categorization of Indonesian Student Stress Level Data

Score Interval	Frequency	Percentage (%)	Category
$x \geq 40.00$	0	0.0	Very High
$30.00 \leq \text{up to} < 40.00$	41	25.8	High
$20.00 \leq \text{up to} < 30.00$	98	61.6	Low
$x < 20.00$	20	12.6	Very Low
Total	159	100.0	

Source: Primary data processed 2022



Table 4

Categorization of Musculoskeletal Disorders Data for Malaysian students

Score Interval	Frequency	Percentage (%)	Category
$x \geq 91.00$	5	3.2	Very Heavy
$70.00 < \text{up to} < 91.00$	65	41.4	Heavy
$49.00 < \text{up to} < 70.00$	73	46.5	Light
$x < 49.00$	14	8.9	Very Light
Total	157	100.0	

Source: Primary data processed 2022

Table 5

Musculoskeletal Disorders Malaysian Students

No	Musculoskeletal disorders	Average respondent answer score
1	Disorders of the neck	2.15
2	Disorders of the nape	2.80
3	Disorders of the left shoulder	2.13
4	Disorders of the right shoulder	2.08
5	Disorders of the left upper arm	1.92
6	Disorders of the back	2.90
7	Disorders of the right upper arm	2.22
8	Disorders of the lower back/waist	3.15
9	Disorders of the hips	2.38
10	Disorders of the buttocks	2.34
11	Disorders of the left elbow	2.29
12	Interference with the right elbow	2.51
13	Disorders of the left forearm	2.66
14	Disorders of the right forearm	2.73
15	Disorders of the left wrist	2.76
16	Disorders of the right wrist	2.75
17	Disorders of the left hand	2.73
18	Disorders of the right hand	2.75
19	Disorders of the left thigh	2.77
20	Disorders of the right thigh	2.75
21	Disorders of the left knee	2.66
22	Disorders of the right knee	2.62
23	Disorders of the left calf	2.47
24	Disorders of the right calf	2.35
25	Disorders of the left ankle	2.21
26	Disorders of the right ankle	2.04
27	Disorders of the left leg	1.65
28	Disorders of the right leg	1.61

Source: Primary data processed 2022



Table 6

Categorization of Malaysian Student Stress Level Data

Score Interval	Frequency	Percentage (%)	Category
$x \geq 40.00$	2	1.3	Very High
$30.00 \leq \text{up to} < 40.00$	48	30.6	High
$20.00 \leq \text{up to} < 30.00$	98	62.4	Low
$x < 20.00$	9	5.7	Very Low
Total	157	100.0	

Source: Primary data processed 2022

Based on the table above it is known that Malaysian students experience stress levels as many as 2 people (1.3%) are included in the very high category, 48 people (30.6%) are in the high category, 98 people (63.4%) are in the low category, and 9 people (5.7%) are included in the very low category.

Comparison Test Results

The normality test is carried out to test whether the data has a normal distribution or not. The data normality testing method in this study used the Kolmogorof Smirnov test. The normality test results are shown in the table 7 below.

Table 7

Indonesia and Malaysia Data Normality Test Results

Data	KSZ	p	Desc.
Indonesia			
Musculoskeletal Disorders	1.095	0.182	Normally
Stress levels	1.074	0.199	Normally
Malaysia			
Musculoskeletal Disorders	0.823	0.508	Normally
Stress levels	1.274	0.078	Normally

Source: Primary data processed 2022

Normality test results on musculoskeletal disorder data obtained a KSZ value of 1.095 and a significance value of 0.182. Since the significance value is greater than 0.05 ($p > 0.05$), the data on musculoskeletal disorders is declared normal. This means that musculoskeletal disorder data are eligible for analysis using parametric statistics.

In the stress level data, the KSZ value was 1.074 and the significance value was 0.199. Because the significance value is greater than 0.05 ($p > 0.05$), the stress level data is declared normal. This means that stress level data qualifies for parametric statistical analysis.

Normality test results on musculoskeletal disorder data obtained a KSZ value of 0.823 and a significance value of 0.508. Since the significance

value is greater than 0.05 ($p > 0.05$), the data on musculoskeletal disorders is declared normal. This means that musculoskeletal disorder data are eligible for analysis using parametric statistics.

In the stress level data, the KSZ value was 1.274 and the significance value was 0.078. Because the significance value is greater than 0.05 ($p > 0.05$), the stress level data is declared normal. This means that stress level data qualifies for parametric statistical analysis.

The results of the homogeneity test to test the similarity of variance of musculoskeletal disorder data between Indonesia and Malaysia obtained a calculated F value of 0.259 with a significance value of 0.611.



Since the significance value is greater than 0.05 ($p > 0.05$), it can be stated that the data on musculoskeletal disorders between Indonesia and Malaysia are homogeneous. This means that musculoskeletal disorder data are eligible for analysis using parametric statistics.

The results of the homogeneity test to test the similarity of variance of stress level data between Indonesia and Malaysia obtained a calculated F value of 3.664 with a significance value of 0.057. Since the

significance value is greater than 0.05 ($p > 0.05$), it can be stated that the stress level data between Indonesia and Malaysia is homogeneous.

Musculoskeletal Disorders

The test of comparing musculoskeletal disorder data was carried out using parametric analysis, namely the Independent Sample t-test. The results of the analysis are as follows (Table 8).

Table 8

The results of a comparative analysis of the number of disorders of the musculoskeletal system in students from Indonesia and Malaysia

Data	Group	Mean	t count	P	Desc.
Musculoskeletal disorders, very heavy, heavy, light, very light	Indonesia	62.15	4.076	0.000	Significant
	Malaysia	68.36			

Source: Primary data processed 2022

Based on the results of the Independent Sample t-test, a calculated t-value of 4.076 with a significance value of 0.000 was obtained. Because the significance value of 0.000 is less than 0.05 ($p < 0.05$), it can be concluded that there is a significant difference in musculoskeletal disorders between Indonesian and Malaysian students.

Based on the results of the analysis, the average score of musculoskeletal disorders in Indonesian students was 62.15 with a disorder in the lower back with an average of 3.14, the next most common disorder is back disorders with an average of 2.72, and disorders in the nape with an average of 2.69. While the average score of musculoskeletal disorders of Malaysian students was 68.36 with a

disorder in the lower back with an average of 3.15. The next most common disorder is a disorder in the back with an average of 2.90 and the next disorder is in the nape with an average of 2.80. It can be interpreted that students from Malaysia have higher musculoskeletal disorders compared to Indonesian students.

Stress Levels

The test of comparing stress level data was carried out using parametric analysis, namely the Independent Sample t-test. The results of the analysis are as follows (Table 9).

Table 9

The results of a comparative analysis of the number of disorders of the stress level in students from Indonesia and Malaysia

Data	Group	Mean	t count	p	Desc.
Stress levels, very high, high low category, very low	Indonesia	15.66	3.624	0.000	Significant
	Malaysia	17.77			

Source: Primary data processed 2022



Based on the results of the Independent Sample t-test analysis, a calculated t-value of 3.624 with a significance value of 0.000 was obtained. Because the significance value of 0.000 is less than 0.05 ($p < 0.05$), it can be concluded that there is a significant difference in stress levels between Indonesian and Malaysian students.

Based on the results of the analysis, the average stress level of Indonesian students was 15.66 with the categorization 0 people (0%) are included in the very high category, 41 people (25.8%) are in the high category, 98 people (61.6%) are in the a low category, and 20 people (12.6%) are included in the very low category. While the average stress level of Malaysian students is 17.77 with categorization 2 people (1.3%) are included in the very high category, 48 people (30.6%) are in the high category, 98 people (63.4%) are in the low category, and 9 people (5.7%) are included in the very low category. It can be interpreted that students from Malaysia have a higher level of stress compared to Indonesian students.

Discussion

Based on the results of the Independent Sample t test, a calculated t value of 4.076 with a significance value of 0.000 was obtained. Because the significance value of 0.000 is smaller than 0.05 ($p < 0.05$), it can be concluded that there is a significant difference in musculoskeletal disorders between Indonesian and Malaysian students. Based on the table above, it is known that the most common musculoskeletal disorder experienced by Malaysian

students is a disorder in the lower back with an average of 3.15. The next most common disorder is a disorder in the back with an average of 2.90 and the next disorder is in the nape with an average of 2.80. It can be concluded that the disorder most experienced musculoskeletal by Malaysian students is a disorder of the lower back.

Based on the results of the analysis, the average value of musculoskeletal disorders in Indonesian students was 62.15 while the average value of musculoskeletal disorders in Malaysian students was 68.36. It can be interpreted that students from Malaysia have higher musculoskeletal disorders compared to Indonesian students.

Musculoskeletal disorders are a series of complaints in muscles, bones, joints, tendons, ligaments, fascia, and cartilage caused by repetitive

work and over a longtime cycle. Musculoskeletal disorders are complaints in the skeletal muscles that a person feels ranging from very mild to severe complaints if the muscles receive static loads repeatedly and over a long period, it can cause damage to muscles, tendon nerves, joints, cartilage, and discus intervetebralis [27, 28].

Musculoskeletal disorders are complaints in parts of the skeletal muscles that are felt by a person ranging from very mild complaints to very painful. If the muscle receives static loads repeatedly and for a long time, it can cause complaints in the form of damage to joints, ligaments, and tendons. Complaints that result in damage are called musculoskeletal disorders or injuries to the musculoskeletal system [28, 29]. Musculoskeletal disorder is a complaint or disorder experienced due to damage to muscles, nerves, tendons, ligaments, joints, cartilage, and intervertebral discs.

Disorders can be damage to the muscles which can be muscle tension, inflammation, and degeneration [30, 31, 32]. Disorders of the musculoskeletal can be a pain in the muscles that signal the muscles need to rest. Musculoskeletal disorders occur when a part of the body is forced to work harder which is more than its function. The severity of the impact of the disorder or injury that occurs varies depending on the cause.

Factors causing musculoskeletal disorders in humans are work attitudes that are not ergonomic such as static attitudes carried out over a long period, repeated twisting and lowering movements), working using excessive force, repetitive movements, manual lifting, working with fast movements, vibrations throughout the body, and so on are triggers for musculoskeletal problems [27]. Prevalence musculoskeletal disorders can occur with age, at productive age at risk of experiencing musculoskeletal complaints generally in students and college students whose age range is 15-24, namely 1.5-7% [28]. Students and students are at risk of musculoskeletal disorders because routine activities carried out when participating in online learning such as non-ergonomic posture positions when studying, inappropriate table shapes, and lecture tools can trigger musculoskeletal complaints [33, 34]. Risk factors for musculoskeletal pain include individual factors, psychosocial factors, and occupational or biomechanical factors [29, 30, 35]



Based on the results of the Independent Sample t-test analysis, a calculated t value of 3.624 with a significance value of 0.000 was obtained. Because the significance value of 0.000 is less than 0.05 ($p < 0.05$), it can be concluded that there is a significant difference in stress levels between Indonesian and Malaysian students. Based on the results of the analysis, the average value of stress levels in Indonesian students was 15.66 while the average value of stress levels in Malaysian students was 17.77. It can be interpreted that students from Malaysia have a higher level of stress compared to Indonesian students. Based on the table above, it is known that most Malaysian students experience low-stress levels, namely 98 people (63.4%), as many as 48 people (30.6%) experience high stress, and as many as 2 people (1.3%) experience very high category stress.

Stress is the body's nonspecific response to everything, be it a good response or a bad response. Another definition states that stress is an individual's response to the presence of a stressor [33, 36]. Stress will appear to the individual when there is an imbalance or failure of the individual in meeting his needs both physical and spiritual [22, 37]. The appearance of stress can be caused by factors that come from within oneself and factors that come from outside oneself. Several things can cause stress in an individual, namely: feelings of anxiety about the results achieved, unbalanced activities, pressure from within oneself, uncertain conditions, anxiety, an overly emotional psyche, feelings of guilt, and socioeconomic conditions [38, 39].

In the context of students, there are four sources of stress, namely Interpersonal, Intrapersonal, Academic, and Environmental. Interpersonal is a stressor that results from relationships with other people, for example, conflicts with parents, friends, lecturers, or girlfriends. Intrapersonal is a stressor that originates within the individual himself, for example, financial difficulties, changes in eating or sleeping habits, and declining health. Academic is a stressor related to lecture activities and the

problems that followed, such as poor test scores, voluminous assignments, and difficult subject matter. The environment is a stressor that comes from the surrounding environment, in addition to academics, for example, lack of vacation time, traffic jams, and an uncomfortable living environment [39, 40].

Conclusion

Significant differences were revealed in the number of disorders of the musculoskeletal system of students from Indonesia and Malaysia ($p < 0.05$). The highest number for abnormalities in the lower back area for Malaysian students is 3.15, while for Indonesian students it is 3.14. For the level of stress due to online learning on students there is a significant difference between Indonesian and Malaysian students ($p < 0.05$). Based on the analysis, the average stress level for Indonesian students is 15.66, while the average stress level for Malaysian students is 17.77.

It can be concluded that students from Malaysia experience higher musculoskeletal disorders in the lower back and high stress levels due to online learning compared to Indonesian students.

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Conflict of interest

The authors declare that there is no conflict of interest.



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